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Internet interventions for common mental health disorders in low and middle income countries, and treating depression in Indonesia

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ISBN (print) : 978-94-034-1189-7
ISBN (digital) : 978-94-034-1188-0

Author : Retha Arjadi
Cover : Leo Agung Manggala Y; Almira Rahma
Print : Ridderprint

This research is facilitated by full PhD scholarship funding from The Indonesia Endowment Fund for Education, Ministry of Finance, Republic of Indonesia (number 790/LPDP/2013), and general funding from University of Groningen (number 170250067).

rijksuniversiteit groningen

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Proefschrift

ter verkrijging van de graad van doctor aan de
Rijksuniversiteit Groningen
op gezag van de
rector magnificus prof. dr. E. Sterken
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

donderdag 13 december 2018 om 16.15 uur

door

Retha Arjadi

geboren op 2 december 1988
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To all who never give up on their hopes

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CHAPTER 1
General Introduction

Depression

Depression is a common mental illness and is one of the leading causes of global burden disease (Ferrari et al., 2013). The lifetime prevalence of depression ranges from 10% to 15% (Lépine & Briley, 2011), and depressed individuals, both clinical and subclinical, are reported to have a significantly increased risk of dying compared to non-depressed individuals (Cuijpers & Smit, 2002). Depressed men and women are, respectively, 21 and 27 times more likely to commit suicide than individuals in the general population (Osby, Brandt, Correia, Ekbom, & Sparén, 2001).

There are various types of depressive disorders described in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), including Major Depressive Disorder, Persistent Depressive Disorder, and Premenstrual Dysphoric Disorder (American Psychiatric Association, 2013). This thesis will mainly focus on Major Depressive Disorder (MDD) which characterized by depressed mood and lack of interest for at least two weeks, and Persistent Depressive Disorder (PDD), a diagnosis for depressive symptoms that lasts for at least two years (American Psychiatric Association, 2013).

Mental Health Gap and recommendations by the World Health Organization (WHO)

Despite the above-mentioned adverse outcomes of depression, depression is widely underdiagnosed and untreated in many countries. For severe mental health conditions in general, depression included, it is reported that up to 85% of individuals suffering from a severe mental health condition in low-middle income countries (LMICs) do not receive the treatment they need (Demyttenaere et al., 2004). This is mainly due to the limited availability of mental health services in such countries and the disproportionate ratio of patients to mental health professionals (Bruckner et al., 2011; Hanlon et al., 2014), leading to both little knowledge of mental health facilities and long distance to available mental health facilities. The ratio of mental health workforce per inhabitants is 0.7 per 100,000 people in low income countries, and

5.9 per 100,000 people in lower-middle income countries is, whereas this ratio is 16.1 per 100,000 people in upper-middle income countries and 65.4 per 100,000 people in high income countries (World Health Organization, 2015). Apart from limited treatment availability, negative stigma and lack of awareness also serves as a barrier to mental health related help seeking behavior in LMICs (Mascayano, Armijo, & Yang, 2015). Therefore, many LMICs are facing difficulties in managing mental health problems, where many people who need mental health treatments do not receive any. This is also referred to as the "mental health gap".

To address this issue, the World Health Organization (WHO) introduced the mental health Gap Action Programme (mhGAP), aiming at scaling up mental health care in LMICs. Depression is included in mhGAP as a priority condition, together with some other mental illnesses, self-harm and suicide (World Health Organization, 2016). There are key challenges to the development of mental health services in LMICs, i.e. lack of mental health laws and policies, limited financial resources for mental health, poor organization and planning in implementing mental health services, and lack of training and use of evidence-based intervention for mental health problems (Rathod et al., 2017). Important strategies are developed and implemented by the WHO to accomplish the aim of bridging the mental health gap.

In general, the WHO recommends government ministries and health professionals to develop evidence-based public health and clinical interventions (Fleischmann & Saxena, 2013). Furthermore, the WHO recommends the use of adapted intervention templates for different countries or regions based on local conditions, including mental health priority conditions, evidence on efficacy and acceptability, costs, and health seeking behavior in the community (World Health Organization, 2008a, 2016). Internet-based intervention is an option. Internet-based interventions can be defined as interventions that are mainly delivered via the internet with at least some therapeutic tasks delegated to the computer (Andersson & Titov, 2014). Initiatives of developing internet-based interventions for mental health were first undertaken in high income countries (HICs) with relatively large low-

density population areas and large distances to mental health facilities, for instance Sweden (Andersson et al., 2005) and Australia (Christensen, Griffiths, & Jorm, 2004; Christensen, Griffiths, & Korten, 2002). Later, they were also developed across other HICs (e.g. Carlbring et al., 2013; Johansson et al., 2012; Lange et al., 2003; Nobis et al., 2015). Internet-based interventions can reach a large number of people with relatively low costs, including those who live far from the mental health care facilities or live in rural areas.

Another important point suggested by the WHO is the use of task sharing where health professionals are in short supply by allocating some of the priority interventions delivery to community health workers who receive specific training and are provided with necessary supervisions (World Health Organization, 2016). The task sharing approach has a high potential in improving the reach of mental health care in low-resource settings (Hoeft, Fortney, Patel, & Unützer, 2018).

Depression and the mental health gap in Indonesia

The point prevalence of depression in Indonesia is reported at 3.7% (World Health Organization, 2017). Another documentation, a cross-sectional national population survey in 2014-2015 in Indonesia reported high prevalence (21.8%) of moderate and severe depressive symptoms from 31,442 Indonesian adults (Mean age=37.3 years, SD=14.9, Range=15-101 years) measured by the Centers for Epidemiologic Studies Depression Scale (CES-D-10) (Peltzer & Pengpid, 2018). On the other hand, the ratio of mental health workers to inhabitants is low, i.e. 3.10 per 100,000 people (World Health Organization, 2015). In Indonesia, the basic health service facility is provided by the government in a form of community health center (in Bahasa Indonesia: Pusat Kesehatan Masyarakat or Puskesmas). Community health centers exist in every district inside a province. A recent report showed that the ratio of community health centers to inhabitants is 3.83 to 100,000 all around Indonesia (Kementerian Kesehatan Republik Indonesia, 2016), with a large regional variability. The ratio of community health centers mentioned above does not fully represent accessibility rates, since accessibility also depends on proximity and the availability of private sector health facilities.

As an archipelago country, where developments of facilities as well as infrastructures tend to be centralized in one island, namely Java Island, and in urban regions, Indonesia faces a challenge with regard to not only uneven distribution of mental health professionals, but also uneven distribution of residents around the country. For instance, the three highest ratios of mental health professionals per inhabitants are found in the eastern part of Indonesia (Papua Barat with 17.33:100,000; Papua with 12.50:100,000; and Maluku with 11.80:100,000), while the three lowest ratios are found in Java Island (Banten with only 1.93:100,000; West Java with 2.23:100,000; and East Java with 2.47:100,000). However, the high ratio in the eastern part of Indonesia is caused by the fact that the area is large but only inhabited by a relatively small number of inhabitants. Meanwhile, Java Island is the most populated island in Indonesia and its health facilities are also supported by private sectors. Therefore, the provision of health services in Java Island is not solely dependent on the community health centers provided by the government (Kementerian Kesehatan Republik Indonesia, 2016). However, not all health facilities in all islands and provinces in Indonesia provide a specialized mental health service. In conclusion, access to mental health care in Indonesia is limited and varied across the country.

Internet-based interventions in Indonesia

Given the picture of mental health accessibility in Indonesia as it was described in the previous paragraphs, Indonesia is among the countries listed for intensified support by the World Health Organization on the mental health gap action program (World Health Organization, 2008a). The Indonesian government has tried to deal with the mental health gap in Indonesia. One important development is the fact that a formal law regarding mental health was ratified by the government in 2014. In addition, following the law ratification, mental health services are covered as part of National Health Care Security (in Bahasa Indonesia: Badan Penyelenggara Jaminan Sosial Kesehatan) and community health centers started to recruit psychologists as part of their professional human resources. However, this program has only

been running for a few years and still needs to be improved. Therefore, despite these positive developments, it is important to find additional efficient ways to provide mental health treatments that have potential to be easily distributed and be relatively low in costs, for those in need. One of the options would be using internet-based interventions.

The use of internet-based interventions has grown in recent years due to its flexible usage in terms of time and place (Barak, Hen, Boniel-Nissim, & Shapira, 2008) as well as its promise regarding relatively low-cost delivery of mental health interventions for a large population with less stigma (Warmerdam, Smit, van Straten, Riper, & Cuijpers, 2010). Internet-based interventions have been widely used in HICs to treat mental health problems and disorders. There are a number of meta-analyses reporting the effectiveness of such interventions for diverse mental health problems (Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010; Spek et al., 2007). Specifically for depression, internet-based interventions show consistent positive results with effect size of 0.32 to 0.56 (Richards & Richardson, 2012; Spek et al., 2007) across different approaches. With regard to its delivery, therapist support for internet-based interventions proved crucial, since the effect sizes of therapist-assisted internet-based interventions were higher than those of non-supported internet-based interventions (Andersson & Cuijpers, 2009; Spek et al., 2007), and therapist-support is also known to enhance treatment adherence, which in turn, related to treatment outcome (Christensen, Griffiths, & Farrer, 2009).

However, these findings were all based on randomized controlled trials conducted in HICs. Given the potential of internet-based interventions and given the mental health gap in LMICs, it might be a promising strategy to use the internet in delivering psychological interventions in LMICs, in this case particularly in Indonesia.

However, so far, it is unclear if internet-based interventions are also effective in LMICs, including Indonesia, and whether the concept of internet-based interventions for mental health problems would be acceptable for Indonesian people. Therefore, the first step is to do a systematic review on the effect of internet-based interventions for mental health conditions in LMICs. A further step would be to

check the acceptability of such interventions in Indonesia. A study on m-health (mobile-delivery health service) adaptation (Rai, Chen, Pye, & Baird, 2013) demonstrated the importance of examining behavioral intention to start using technology-based care as well as to use it as a complement or a substitute to face-to-face care. The same approach can be utilized for the context of internet-based intervention for depression in the Indonesian population. The results can later be used as a basis to build an internet-based intervention, and to conduct a randomized controlled trial to evaluate its effectiveness in treating depression in Indonesia.

Depression measures in Indonesia

Given the mental health gap in Indonesia, it is difficult for depressed individuals to receive the proper mental health services, including screening, clinical assessment and treatment. Different tools are suitable for examining and diagnosing depression, i.e. clinical interviews, clinician-administered questionnaires, and self-report questionnaires. Some self-report questionnaires are reported to have reasonable capacity to identify depression (Stuart et al., 2014). Questionnaires have advantages over clinical interviews: they are time-efficient compared to structured clinical interviews, and the delivery does not require the presence of a mental health professional, who needs to have received an extensive training for administering such a diagnostic interview. For use of such questionnaire in clinical practice, information on psychometric properties as well as norm scores should be available.

Unfortunately, to the best of our knowledge, there are only a few self-report questionnaires for depression available in Indonesia, including the Indonesian version of PHQ-9 (Kroenke, Spitzer, & Williams, 2001) and the Indonesian version of Beck Depression Inventory-I or BDI-I (Suwantara, Lubis, & Rusli, 2005). However, there is no available information on psychometric properties of the Indonesian version of PHQ-9 and the only available information from the Indonesian version of BDI-I is that it can differentiate diagnosed depressed individuals from non-depressed individuals based on comparison of the scores

between four subject groups: individuals with major depressive disorder, individuals with substance use disorder, individuals with other disorders, and healthy individuals (Suwantara et al., 2005). Given the potential to improve mental services in Indonesia, a contribution of a freely accessible, high quality self-report assessment tool for depression is considered important. Such instrument should not only able to provide cut-off score for depression, but should also be reliable and has a valid factor structure. Such instrument can be beneficial for screening, for supporting a diagnosis and for monitoring depression levels over the course of therapy.

Treating depression: behavioral activation

Behavioral activation (BA) is a psychological treatment based on behavioral theory, assuming that depression is a consequence of low rates of response-contingent positive reinforcement. BA concentrates on activating individuals to increase contact with potential reinforcers around them (Lewinsohn, 1985). Other BA models also emphasize the role of avoidance in the maintenance in depression. As part of this BA model, depressed individuals are taught how avoidance behavior can maintain their depression, and how to break the pattern from predominantly reactive (often avoidant) behavior towards proactive behavior (Kanter, Puspitasari, Santos, & Nagy, 2012). The main focus of BA is to increase potentially relaxing and pleasurable activities in daily basis. These activities should be preplanned and be performed mood independent in order to improve mood and overcome depression. In general, BA has a relatively easy rational and is relatively easy to implement. It consists of structured steps, including teaching depressed individuals to monitor their daily mood and behaviors or activities, then schedule activities (mood independently) and increase daily pleasurable activities (Kanter et al., 2012; Lewinsohn, 1985).

BA is a well-established intervention for depression that has been widely studied in HICs and in some studies in LMICs (e.g. Chowdhary et al., 2016; Dimidjian et al., 2006; Ekers, Richards, McMillan, Bland, & Gilbody, 2011). BA is known as an effective treatment for depression with effect sizes of 0.74 compared to controls (i.e. waitlist, treatment as

usual, placebo) and 0.42 compared to medication (Ekers et al., 2014). Furthermore, one study reported that BA was superior to cognitive therapy in severely depressed patients (Dimidjian et al., 2006), and that the effect of BA sustained for 28% of participants after two years (Dobson et al., 2008).

Given the reported effectiveness of BA and the fact that BA is relatively easy to implement, BA may be a candidate treatment to adapt to another culture and country, and to an internet-based version.

Non-specialist support in minimal interventions

As encouraged by the WHO in its mhGAP action programme (World Health Organization, 2008a), it is recommended to involve non-specialists or lay people in delivering psychological interventions in LMICs, including the low-intensity interventions (Bockting, Williams, Carswell, & Grech, 2016). Numerous studies have reported on successful delivery of effective face-to-face psychological interventions by non-specialists in LMICs, for instance in Uganda (Bolton et al., 2003), Pakistan (Rahman, Malik, Sikander, Roberts, & Creed, 2008), and India (Patel et al., 2017). A recent systematic review reported that psychological interventions delivered by non-specialists for common mental disorders including depression showed an effect size of 0.49 in LMICs (Singla et al., 2017).

In the context of internet-based interventions, specific support delivered by non-specialists may be as effective as feedback by professionals. A study on an internet-based intervention for depression in Australia showed that the within group effect size of clinical-assisted and technician-assisted conditions, measured by the Patient Health Questionnaire 9 (PHQ-9), were similarly high (1.54 and 1.60 respectively) (Titov et al., 2010).

Given the need of improving access, the potential of internet-based interventions and positive experience with lay people in delivering mental health services in LMICs, along with evidence of non-specialist support in internet-based interventions, and the fact that it required less costs than a specialist, it may be most useful to use non-specialists when designing therapist-assisted internet-based interventions in LMICs.

Thesis scope and outline

In general, this thesis aims to investigate the current state of internet-based interventions for mental health problems in LMICs and to explore the potential to bridge the mental health gap using an internet-based treatment supported by lay counselors in a specific LMIC, namely Indonesia. This thesis contains the following chapters:

1. Chapter 1: General introduction

The first chapter presents extensive backgrounds of the relevance of the studies as reported in this thesis, followed by the thesis aim and outline.

2. Chapter 2: Neglected potential of internet-based interventions for mental health in LMICs: a systematic review

In this chapter, the evidence for the effect of internet-based intervention in LMICs will be reported based on a study using a systematic review approach.

3. Chapter 3: Potential acceptability of internet-based interventions for depression in Indonesia

This chapter will focus on factors that may contribute to Indonesians' behavioral intention to start or not start using internet-based intervention for depression as well as to use it as a complement to or a substitute of regular treatment.

4. Chapter 4: Self-report assessment to support mental health services: Indonesian version of the Inventory of Depressive Symptomatology-Self Report (IDS-SR)

The fourth chapter offers a full report on psychometric properties of a widely used self-report questionnaire of depression, i.e. IDS-SR. Factor structures, reliability, validity, and a clinical cut-off will be presented.

5. Chapter 5: Trial protocol of a randomized clinical trial for internet-based behavioral activation intervention for depression guided by non-specialists in Indonesia

Chapter five will demonstrate a detailed description of the design of a randomized clinical trial on the effect of internet-based BA intervention guided by lay counselors.

6. Chapter 6: Effectiveness of an internet-based behavioral activation intervention for depression guided by lay counselors in Indonesia: a randomized clinical trial

In this chapter, we will report the results of the randomized clinical trial that has been conducted in Indonesia, evaluating the effectiveness of an internet-based BA intervention with lay counselor support compared to online-delivered minimal psychoeducation without support.

7. Chapter 7: General discussion

In the last chapter, results from all studies presented in this thesis will be discussed. Limitations and recommendations regarding clinical practice, future research and implementation issues in Indonesia and other LMICs will be discussed.

CHAPTER 2

Neglected potential of internet-based interventions for mental health in LMICs: a systematic review

Arjadi, R., Nauta, M. H., Chowdhary, N., & Bockting, C. L. H. (2015). A systematic review of internet-based interventions for mental health in low and middle income countries: a neglected field. *Global Mental Health, 2,* e12. https://doi.org/10.1017/gmh.2015.10

Abstract

Background

Low and middle income countries (LMICs) are facing an increase of the impact of mental health problems while confronted with limited resources and limited access to mental health care, known as the 'mental health gap'. One strategy to reduce the mental health gap would be to utilize the internet to provide more widely-distributed and low cost mental health care. We undertook this systematic review to investigate the effectiveness and efficacy of online interventions in LMICs.

Methods

We systematically searched the databases PubMed, PsycINFO, JMIR, and additional sources. MeSH terms, Thesaurus, and free text keywords were used. We included all randomized controlled trials (RCTs) of internet-based interventions in LMICs.

Results

We found only three articles reported results of RCTs on internet-based interventions for mental health conditions in LMICs, but none of these interventions was compared with an active control condition. Also, the mental health conditions were diverse across the three studies.

Conclusions

There is a dearth of studies examining the effect of internet-based interventions in LMICs, so we cannot draw a firm conclusion on its effectiveness. However, given the effectiveness of internet-based interventions in high income countries and sharp increase of internet access in LMICs, internet-based interventions may offer a potential to help reduce the 'mental health gap'. More studies are urgently needed in LMICs.

Introduction

Mental, neurological, and substance abuse (MNS) disorders are so highly prevalent in all regions around the world, that they have become major contributors to morbidity and premature mortality (World Health Organization, 2008a). Fourteen percent (14%) of the global burden of disease, measured in disability-adjusted life years, can be attributed to MNS disorders. These figures pose a challenge to make the prevention and treatment of mental disorders a public health priority in both high income countries (HICs) and low-middle income countries or LMICs (Whiteford et al., 2013).

In contrast to the relatively high availability of psychological treatments and mental health care professionals in HICs, it is estimated that between 76 and 85% of the people with severe mental disorders receive no treatment at all in LMICs (World Health Organization, 2013). From the financial perspective, for instance, India only has 0.06% mental health expenditures of the total budget by the health department, while China and Indonesia have none (World Health Organization, 2011). On the other hand, HICs like England and the Netherlands have an exclusive budget for mental health expenditures of their total health budget, by 10.8 and 10.7%, respectively (World Health Organization, 2011). Moreover, LMICs also have limited availability of mental health services, and are often characterized by a disproportionate number between patients and mental health professionals (Eaton et al., 2011; Kakuma et al., 2011; World Health Organization, 2008a, 2013). Therefore, in general, LMICs are facing difficulties in handling mental health problems, where most people who need mental health services do not receive any, known as the 'mental health gap' (World Health Organization, 2008a).

The WHO launched the Mental Health Gap Action Programme (mhGAP) to scale up mental health care in LMICs and stressed the strategy of providing evidence-based interventions in non-specialized healthcare settings (World Health Organization, 2010). Internet-based interventions can be one promising strategy to overcome this gap, given the sharp increase of internet access of individuals in these countries and that thereby is easily accessible from various places

throughout a country, and may be relatively low-cost. Internet-based interventions have been extensively studied in HICs and several meta-analyses demonstrate that they are effective in treating psychological problems and disorders. A meta-analysis of 12 studies of computer and internet-based interventions for depression in HICs reported effect sizes ranging from 0.00 to 1.30, with a mean of 0.41 (95% CI=0.29 to 0.54) (Andersson & Cuijpers, 2009). Another meta-analysis of 22 studies on computerized interventions for depression and anxiety in HICs showed overall effect sizes ranging from 0.28 to1.26, with mean of 0.78 (95% CI=0.59 to 0.96) for depression, mean of 0.92 (95% CI=0.74 to 1.09) for social phobia, mean of 0.83 (95% CI=0.45 to 1.21) for panic disorder, and mean of 1.12 (95% CI=0.76 to 1.47) for generalized anxiety disorder (Andrews et al., 2010). Recent reports indicate that internet-based interventions are effective in HICs, but questions have been raised whether this also holds for less developed countries (Andersson & Titov, 2014).

In countries without a proper mental health insurance system (e.g. India and Indonesia), access to mental health services is limited to people with higher socio-economic status. Internet-based interventions, referring to standardized psychological treatments provided online, in which patients can help themselves, either independently or with the help of a therapist (Donker et al., 2009), have the potential to be less costly and to be more efficient (Bennet-Levy et al., 2010). This approach increases access to mental health care with a minimum of therapist time, allowing a larger number of patients to benefit (Bennet-Levy et al., 2010; Rochlen, Zack, & Speyer, 2004). Furthermore, internet-based interventions may partly overcome stigma associated with having a mental illness (Rochlen et al., 2004). Overcoming stigma is one of the reasons why internet-based interventions have been easily accepted in HICs (Rochlen et al., 2004) and have the potential to help bridge the 'mental health gap' in LMICs.

In the current study, we provide the results of a systematic search on randomized controlled trials (RCTs) on internet-based interventions for mental health problems in LMICs.

Methods

Inclusion criteria

We included RCT empirical studies on the efficacy and effectiveness of internet-based interventions for mental health disorders or symptoms. Studies on medical problems (e.g. hypertension and diabetes) as well as studies focused on lifestyle (e.g. smoking, obesity, exercise, and nutrition) were excluded, because their main focus was not on the mental health state of the participants.

Literature search

We conducted literature searches according to Cochrane guidelines for systematic review (Higgins & Green, 2011) in two electronic databases, PubMed, and PsycINFO. We searched these databases using a combination of MeSH terms, Thesaurus, and free text words. We defined LMIC as a country that is categorized as low, lower-middle, and upper-middle income by the World Bank based on gross national income and gross domestic product, based on the most updated release; at the moment we did the systematic search (World Bank, 2014a). The screening process was conducted until 1 September 2014. We used the MeSH terms and Thesaurus for the following terms: internet, online therapy, intervention, psychotherapy, randomized controlled trial, clinical trial, pilot project, case study, and developing countries. The MeSH terms and Thesaurus terms from both engines were then combined with free text LMIC, LAMIC, LAMI countr*, LMI countr*, low income countr*, middle income countr*, low-middle income countr*, lower-middle income countr*, upper-middle income countr* and also with each country's name on the World Bank's list of LMICs. all with asterisk (*) symbol, for instance Chin* for China and Chinese. We also used freetext internet or online or web- based or electronic mail* or e-therapy or web or self-help or website or computer* or e-health or e-mental health in combination with LAMIC or LMIC or LAMI Countr* or LMI Countr* or low income countr* or middle income countr* or low-middle income countr* or lower-middle income countr*, and upper-middle income countr*. In addition, we also searched using broader terms (i.e. using online or internet and

psychotherapy or intervention), due to the very small number of articles and because authors may not have given information about low-middle income nor mentioned the country name in their titles or abstracts. We also examined an e-collection of web-based and mobile interventions from the Journal of Medical Internet Research (JMIR). The reference list of included articles and previous reviews were checked. If there was insufficient information in the article about the country of the study or regarding details of the study, we sent an email to the corresponding author.

Results

Figure 1 shows the flow diagram of the searching and screening process for the articles retrieved from all sources and search engines using Prisma Flow Diagram (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009). After the final stage of full text eligibility assessment by R. Arjadi, C. L. H. Bockting, and M. H. Nauta, only three RCT papers were selected for inclusion in the review.

Data extraction from each study is presented in Table 1, including the description of the characteristics of each study including the effect size standardized mean differences (SMD) for the primary outcome measures.

Study 1 (Wang, Wang, & Maercker, 2013)

Study 1 was a randomized waitlist controlled trial on the effectiveness of an internet-based intervention for participants with post-traumatic stress disorder in China. The participants were recruited from the community, the university, and hospital counseling centers. Two large parallel samples (urban and rural) samples were included, both providing an intervention group as well as a waitlist. The symptom reduction in the intervention group was larger than wait list in both urban and rural samples at post-test and over a 3-month follow up. At post-test, the effect size in the rural area and urban area are 1.34 and 0.81, respectively. After 3-month follow up, the effect size in the rural area was 0.99 and in the urban area was 0.87.

2

Prisma 2009 Flow Diagram

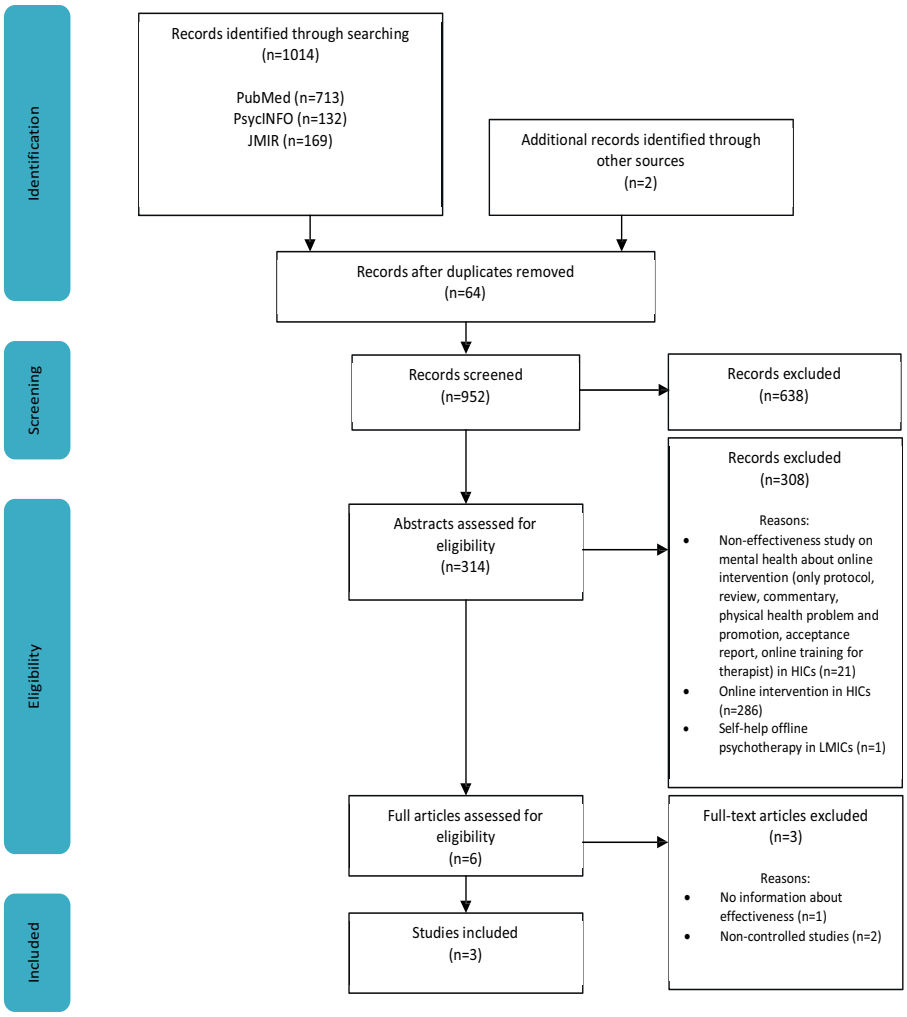

Figure 2.1. Prisma flow diagram

Table 2.1. Data extraction of each study

First author and year	Recruitment	MH condition	N (originally)	Age group	Outcome measures	Intervention and number of modules/time	Supervision	Contact	Randomi-zation	Blinding	Control group	Follow-up	Measurement time	Dropout	Country
Wang (2013)	Community, university and hospital counseling center	PTSD	197	18-70 year-old	PDS, SCL-D, PCC, SFI, CSE	My Trauma Recovery website (social cognitive); 6 modules; 1 month	None, except for technical difficulties in accessing the website	Phone call for recruitment and technical support	Yes	No	Waitlist	3 months	Pre-test, post-test, follow-up	38.6%	China
Mogoaşe (2013)	University student	Depressive symptoms	42	Mean: 22.87 year-old	PEQ, AMT, BDI-II, RRS, GE	Concreteness training delivered via email; 7 modules; 7 days	Researcher, only to remind the participants via email if they do not finish their daily assignment	Entirely online (email)	Yes	No	Waitlist	None	Pre-test and post-test	2%	Romania
Sau (2011)	University student	Internet addiction	65	Mean: 22.3 year-old (18-28 year-old)	YDQ, Online hours per week, Online satisfaction	Healthy online self-helping center (CBT); 4 modules; 1 day	None	Interview for screening; Feedback via website; sms for follow-up reminder	Yes	No	Waitlist	None	Pre-test and post-test (mentioned as follow-up 1 month in the article)	9%	China

PDS (Post-traumatic Diagnostic Scale), SCL-D (Symptom Checklist 90-Depression), PCC (Post-traumatic Cognitive Changes), SFI (Social, Functioning Impairment), CSE (Trauma Coping Self-efficacy Scale), PEQ (Problem Elaboration Questionnaire), AMT (Autobiographical Memory Test), BDI-II (Beck Depression Inventory-II), RRS (Rumination Response Scale), GE (Global Evaluation/ Self-drowning), YDQ (Young's Diagnostic Questionnaire).

Study 2 (Mogoaşe, Brăilean, & David, 2013)

This is a randomized pilot study investigating concreteness training delivered via email to reduce depressive symptoms in Romania, including undergraduate students who scored high on depression. Participants were randomly assigned to an intervention group or a waitlist. There was no significant difference between the two groups in reduction of depressive symptoms. The effect size was -0.16, indicating that intervention group have higher depression level in comparison with waiting list at post-test.

Study 3 (Su, Fang, Miller, & Wang, 2011)

This study investigated the effectiveness of online cognitive-behavior-based therapy for internet addiction in university students in China, who were assigned to four experimental conditions: laboratory environmental group (where the participants received the internet-based intervention under laboratory conditions), natural environmental group (where the participants provided with a registration code and used the internet-based intervention in their private places), laboratory non-interactive group (where the participants used a non-interactive system of internet-based intervention under laboratory condition), and a waitlist. In comparison with the waitlist control group, all the treatment groups showed that the online treatment was more effective in reducing internet addiction. The SMD effect size was 1.68 between laboratory and waitlist, 1.43 between natural environment and waitlist, and 1.09 between non-interactive and waitlist.

Discussions

Surprisingly, only three randomized controlled studies on the effectiveness or efficacy of online psychological interventions have been conducted in LMICs, and none have included an active control condition. Even though our intention with this review was to provide meta-analytic results on the effects of internet-based interventions in LMICs, this proved not feasible due to the scarcity of trials. This finding is especially unexpected given the high prevalence and increasing number of mental health problems worldwide. However, we do have clear evidence that internet-based interventions are effective in HICs.

Therefore it is crucial to study the effects of these internet-based interventions in LMICs.

A prerequisite of internet-based interventions is the availability of a good internet connection, and fortunately, internet access has improved rapidly throughout the world over the past decade. A recent survey (Pew Research Center, 2014), shows that 20% of people use the internet daily in 15 of the 24 LMICs. This is considered to be a significant number. Moreover, the number of internet users in LMICs has been increasing up to 4% each year from 5.7% in 2004 to 26.5% in 2012 (World Bank, 2014b).

A question might rise of why internet-based interventions are not investigated in LMICs as extensively as in HICs. In relation to the mhGAP background, the WHO described a certain condition in LMICs, namely a widely shared idea that all mental health interventions have to be extensive and very sophisticated and can only be delivered by professionals (World Health Organization, 2010). In this sense, it is highly likely that face-to-face interventions are also considered better than non-face-to-face interventions in LMICs. However, recent studies have demonstrated the effectiveness of using psychological interventions in non-specialized health-care settings.

Strengths and limitations of the review

This review was conducted using robust methodology. We systematically searched through several reliable database sources for studies on internet-based interventions in LMICs. However, we cannot answer the question whether internet-based interventions are effective in LMICs yet due to very limited number of studies we found. Another limitation is that we only searched for peer-reviewed articles published in English. There might be more articles published in local journals using the native language of the authors.

Implication

There is an alarming lack of RCTs in LMICs investigating the effectiveness of internet-based interventions. Therefore, more high quality RCT studies on the efficacy and effectiveness of internet-based

interventions are urgently needed, using an active control condition as comparison to evaluate the effects in these countries. We hope that this systematic review can be an impulse to start studies on internet-based interventions in LMICs, in order to bridge the 'mental health gap'.

CHAPTER 3

Potential acceptability of internet-based interventions for depression in Indonesia

Arjadi, R. , Nauta, M. H., & Bockting, C. L. H. (2017). Acceptability of internet-based interventions for depression in Indonesia. *Internet Interventions, 13*: 18-15. https://doi.org/10.1016/j.invent.2018.04.004

Abstract

Background

In Indonesia, internet-based interventions may represent a promising strategy to reduce the mental health gap given that the level of internet usage in the country continues to increase. To check the acceptability of internet-based interventions, this study investigates factors that contribute to the use of internet-based interventions for depression in Indonesia.

Methods

The survey was conducted online and had 904 participants recruited from specific social networks on mental health and general social media (Mean age=27.07, 50.22% females). The three dependent variables were (1) behavioral intention to start using internet-based interventions for depression, (2) preference to use it as a substitute for regular treatments and (3) preference to use it to complement regular treatments. The predictor variables included sociodemographic characteristics, perceived mental health conditions, personal situational characteristics, personal innovativeness toward online services, and depression level.

Results

A large majority reported to be open to using internet-based interventions for depression (73.7%), as well as to use it as a substitution (73.3%) or as a complementary (73%) to regular treatments. Personal innovativeness toward online services was the strongest significant predictor for all types of use, even when corrected for current depression level. When added to the analyses separately, depression level was the second strongest predictive factor for all dependent variables.

Conclusions

The majority of Indonesians showed openness to use internet-based interventions for depression. To increase the adoption of internet-based interventions for depression, it is important to first promote internet usage to more people across the country, especially for those who are currently depressed.

Introduction

As a leading cause of disease burden, depression affects approximately 4.4% of the world population (Ferrari et al., 2013), and approximately 5% of the population (equal to >10 million) in Indonesia (Ferrari et al., 2013). There is a great imbalance between the number of depression cases and the availability of mental health professionals in low-middle income countries (LMICs), including in Indonesia (World Health Organization, 2015).

In the mental health Gap Action Programme (mhGAP), the World Health Organization (WHO) stated the importance of providing mental health interventions that can be widely distributed (World Health Organization, 2008a). The internet may be a potential medium to deliver low-cost interventions widely (Napolitano et al., 2003), which generally known as e-health. Within the field of clinical psychology, there is a form of e-health called internet-based interventions which refers to treatments that are mainly delivered via the internet, with at least some therapeutic tasks delegated to the computer (Andersson & Titov, 2014).

Many clinical trials conducted in high-income countries (HICs) have shown that internet-based interventions are effective for various mental health conditions, including depression (Andersson & Cuijpers, 2009; Andrews et al., 2010). Internet-based intervention have also been evaluated as an acceptable form of psychological treatment in Australia (Gun, Titov, & Andrews, 2011; Spence et al., 2011). However, despite its potential, internet-based interventions have rarely been studied in LMICs, and no research on this topic has been reported from Indonesia (Arjadi, Nauta, Chowdhary, & Bockting, 2015).

In Indonesia, internet-based interventions may pose as a promising strategy to reduce the mental health gap, since the level of internet usage in the country is expected to increase to 50% of the population (120 million people) by 2018 (Asosiasi Penyedia Jasa Internet Indonesia, 2015; Noviandari, 2014). On the other hand, implementing internet-based interventions as a new type of mental health service particularly for depression in such country may also be challenging. For example, a recent study done in India, another LMIC, stressed the importance

of evaluating the contextual acceptability and feasibility prior to the implementation (Chowdhary et al., 2016).

Although that study was done for a face-to-face treatment context, the approach is highly relevant in terms of implementing various psychological treatments in LMICs. Therefore, prior to the implementation, it is important to examine the acceptability of internet-based interventions for depression among Indonesian population by investigating factors that contribute to the use of it.

The most widely used theory of technology acceptance is the Technology Acceptance Model which states that the behavioral intention to use new technology is determined by the perceived ease of use (the degree to which a person believes that using a particular system would be free from effort) and the perceived usefulness (the degree to which a person believes that using particular system would enhance his or her job performance) (Davis, 1989). Previous studies on the Technology Acceptance Model on e-health in LMICs showed that both perceived ease of use and perceived usefulness were important factors of e-health acceptance in the context of mental health (e.g. Hoque, Bao, & Sorwar, 2017; Sobowale, Nguyen, Weiss, Van, & Trung, 2016). Those studies provide evidence that e-health is acceptable to potential users in LMICs.

Next to this perspective on the acceptability of the technical system, it is also considered important to investigate the acceptability from an individual variables perspective (Arning & Ziefle, 2009; Berry, Lobban, Emsley, & Bucci, 2016). These individual variables may be crucial in predicting the actual use of such interventions for mental health problems in LMICs. We will use this perspective for the current study. The relevant individual factors reported from various studies involve sociodemographic characteristics (e.g. Dickerson et al., 2004; Mead, Varnam, Rogers, & Roland, 2003), perceived health conditions (e.g. Rai et al., 2013; Wilson & Lankton, 2004), personal situational characteristics (e.g. Duplaga, 2012; Mead et al., 2003), and psychological characteristics related to technology (e.g. Huang, 2013; Rockmann & Gewald, 2016). A recent study (Rai et al., 2013) in the context of mobile health service as one type of e-health reported results on how those

various factors can predict the acceptability of mobile health service. The study (Rai et al., 2013) also proposed the importance of not only assessing those factors to determine the behavioral intention to start using mobile health service, but also to determine the assimilation (awareness and frequency level of using it), and the preferences to adopt it as a substitutive use (replacement for regular face-to-face treatments) and a complementary use (addition to regular face-to-face treatments). In the results, they reported that some predictive factors for the behavioral intention to start using mobile health service and for the preferences to use it as a substitutive use and a complementary use were different (Rai et al., 2013). Assimilation is not relevant in the current study because internet-based intervention is rarely found and used in Indonesia at the moment. More than 95% of our participants reported that they are not aware of the availability of any internet-based interventions for mental health problems, and those who are aware indicated they were referring to counseling via email or chat, and internet-based interventions provided in countries outside Indonesia.

In this current study, we report the general acceptability of internet-based interventions for depression in Indonesia and investigate factors that predict the use of it. The predictive factors include sociodemographic characteristics (age, sex, education, and socioeconomic status), perceived mental health conditions (perceived current mental healthiness and perceived mental health vulnerability of severe mental health problem in the future), personal situational characteristics (distance to mental health service facilities and history of mental health service usage), and psychological characteristics related to technology (personal innovativeness toward online services which represents the degree of one's willingness to try new online services). Furthermore, since we focus on the topic of internet-based interventions for depression in this study, depression level will be added as an additional predictive factor. We examine how all of these factors contribute to the Indonesians' intention to start using internet-based interventions for depression as well as to adopt it both for substitutive use and for complementary use to regular treatments.

Methods

Participants

The survey was conducted online. The first page of the survey was viewed by 1622 individuals, and 904 participants (55.73%) subsequently completed the survey. The participants' age ranged from 16 to 61 years (M=27.07, SD=7.06) with 454 females (50.22%). Based on the participants' score on the Inventory of Depressive Symptomatology-Self Report (IDS-SR), and according to the internationally used cut-off of 14 as an indication of being depressed (Rush et al., 2003), 43.6% participants were categorized as not depressed (total score 0-13), 31.4% were mildly depressed (total score 14-25) and, 25% were moderately to very severely depressed (total score 26-84).

Procedure

The data were collected via Qualtrics, an internet-based platform for surveys). We recruited participants via invitations on our website (www.actandfeel.com), two other websites on mental health, online forums on mental health, social media, and by word of mouth. Participants provided consent at the beginning of the online survey page by ticking an "agree" button to indicate their agreement to join the study.

Ethical approval

The ethical approval for this study was obtained from the Tarumanagara University Human Research Ethics Committee, Indonesia (project number PPZ20142001).

Measures

Internet-based Interventions Acceptability Questionnaire-Indonesia (IIAQ-ID)

This research followed the line of research by Rai et al. (2013) and thus used the items from that study, aggregated into a 20-item measure called the "Internet-based Interventions Acceptability Questionnaire-Indonesia" (IIAQ-ID). The final questionnaire was derived from discussion within the authors in two languages (English and Bahasa Indonesia). The final questionnaire was then reviewed by

three bilingual Indonesian clinical psychologists to check the cultural expression.

For the dependent variables, there were 3 items to measure behavioral intention to start using internet-based interventions for depression (e.g. "Assuming I have access to internet-based interventions for depression, I intend to use it"), 3 items to measure preference to use it as a substitute for regular treatments (e.g. "I am willing to use internet-based interventions for depression to obtain relevant advice instead of going for a regular face-to-face treatments"), and 3 items to measure preference to use it to complement regular treatments (e.g. "I am willing to use internet-based interventions for depression to obtain relevant advice in addition to a regular face-to-face treatments"). For each item, participants were asked to rate on a 7-point Likert scale from 1 "strongly disagree" to 7 "strongly agree" (score 4 is indicated as neutral). If the mean item-score on the three items of each dependent variable scale was above 4 (or ≥13 in total), this was regarded as a positive attitude toward the use of online interventions for depression.

Predictor variables

There were several predictor variables used in the study, including four items on the sociodemographic characteristics (age, sex, education, and socioeconomic status). A single item was used to measure perceived healthiness in mental health context ("In terms of mental health condition, I feel I am…") with 7-point Likert scale from "very unhealthy" to "very healthy" and another single item was used to measure perceived vulnerability for the same context in the future ("I feel vulnerable to severe mental health problems (i.e. severe depression) in the next five years") with 7-point Likert scale from "strongly disagree" to "strongly agree". Distance to mental health service facilities was measured using a single multiple-choice question with higher score represents higher distance, and the answer "do not know" was given the highest score. History of mental health service usage were measured using another single multiple-choice question with yes or no answer. There were 3 items on the personal innovativeness toward online services (e.g. "I like to experiment with new online services") with 7-point Likert scale from "strongly disagree"

to “strongly agree”. Lastly, the Inventory of Depressive Symptomatology Self Report (IDS-SR) was used as a valid and reliable tool to measure depression level (Rush et al., 1986; Rush, Gullion, Basco, Jarrett, & Trivedi, 1996) as a specific illness characteristic in this study. In the current study, we used the Indonesian version of the IDS-SR (Arjadi, Nauta, Utoyo, & Bockting, 2017).

In the survey, we also presented some screenshots as an example of how an internet-based intervention may look. The screenshots were made from the internet-based intervention for relapse depression developed in The Netherlands called *Depressievrij*, with the content already translated into Bahasa Indonesia specifically for the purpose of this current study. The three clinical psychologists who reviewed the questionnaire also reviewed the content of the screenshots. See Figure 3.1 for screenshot example.

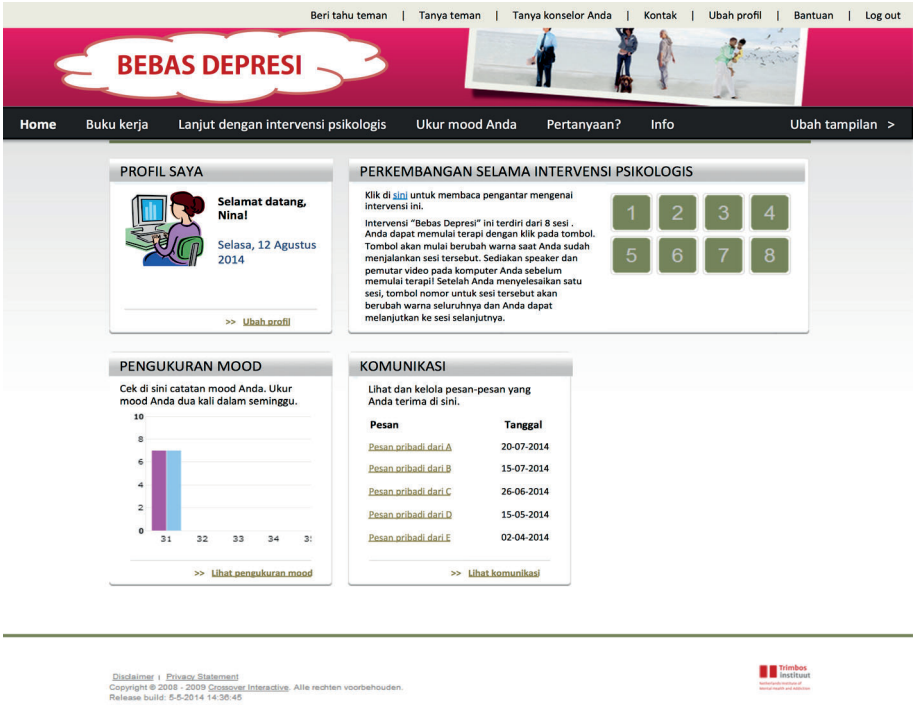

Figure 3.1.
Screenshot example of an internet-based intervention presented in Bahasa Indonesia

Statistical analysis

First of all, we assessed the measurement quality of the IIAQ-ID by reports on the Confirmatory Factor Analysis (CFA), Cronbach's Alpha reliability, and convergent validity (Average Variance Extracted/AVE). Furthermore, we calculated the percentage of participants who had a total score ≥ 13 for each dependent variable.

We conducted different analyses for each dependent variable of 1) behavioral intention to use internet-based interventions for depression, 2) preferences to use internet-based interventions to substitute for regular treatments or 3) to complement regular treatments. The predictors for each analysis included sociodemographic characteristics (age, sex, education, and socioeconomic status), perceived mental health conditions (perceived current mental healthiness and perceived mental health vulnerability in the future), personal situational characteristics (distance to mental health service facilities and history of mental health service usage), psychological characteristic related to technology (personal innovativeness toward online services which represent degree of one's willingness to try new online services), and depression level which represents the focus of the illness characteristic in this study.

Each evaluation was done using stepwise regression. Evaluation for each dependent variable was done twice, firstly without depression level and the later with depression level at first entry. The aim was to examine whether depression level as the illness characteristic may change the predictive power of other factors in the regression analysis of the three dependent variables. We applied Bonferroni correction for alpha level to control for Type I error rate when interpreting predictive power of each predictive factor. Prior to interpretation, collinearity assumption was tested. All analyses were performed using R and SPSS 23.

Results

Measurement quality

We performed CFA and assessed Cronbach's Alpha reliability as well as AVE of the three dependent variables (behavioral usage

intention, substitutive use, and complementary use) and one predictor with multi-item (personal innovativeness toward online services) in the IIAQ-ID. Each construct reported good model fit with CFI>0.9, RMSEA<0.05, and SRMR<0.05 (Hu & Bentler, 1999), and each indicator had adequate factor loading above 0.70 and significant at p<0.05. The convergent validity of each construct was good with average variance extracted (AVE)>0.5 (Fornell & Larcker, 1981). Moreover, for the reliability, the Cronbach's Alpha reliability of all 4 constructs were good, higher than 0.70 (Nunnally & Bernstein, 1994). See Table 3.1 for the details of descriptives, reliability and validity of each construct.

Table 3.1. Descriptives, Reliability, Validity of IIAQ-ID and IDS-SR

Constructs	Possible Range	Mean / N	SD / %	Cronbach's Alpha	AVE (convergent validity)
Dependent variables					
Behavioral usage intention	3-21	15.46	4.12	0.96	0.89
Substitutive use	3-21	15.11	3.98	0.89	0.74
Complementary use	3-21	15.27	4.20	0.95	0.87
Independent variables					
Demographic characteristics					
Age	16-61	27.07	7.06	-	-
Sex					
Male	-	450	49.78%	-	-
Female	-	454	50.22%	-	-
Education					
Below senior high	-	23	2.54%	-	-
Senior high	-	266	29.42%	-	-
Vocational	-	78	8.63%	-	-
Bachelor	-	476	52.66%	-	-
Master	-	61	6.75%		
Socioeconomic status					
Low	-	194	21.46%	-	-
Middle	-	525	58.08%	-	-
High	-	185	20.46%	-	-
Perceived mental health conditions					
Perceived mental healthiness	1-7	5.05	1.53	-	-
Perceived mental health vulnerability	1-7	3.29	1.72	-	-

Personal situational characteristics					
Distance to mental health service facilities					
<5 km	-	236	26.11%	-	-
6 km – 15 km	-	269	29.75%	-	-
16 km – 25 km	-	76	8.41%	-	-
26 km – 35 km	-	30	3.32%	-	-
>35 km	-	44	4.87%	-	-
Do not know	-	249	27.54%	-	-
History of mental health service usage					
Yes	-	78	8.63%	-	-
No	-	826	91.37%	-	-
Psychological characteristic related to technology					
Personal innovativeness toward online services	3-21	14.86	4.09	0.88	0.72
Illness characteristic					
Depression level (IDS-SR)	0-74	18.42	13.00	0.92*	-

*Reliability of the Indonesian version of the IDS-SR (Inventory of Depressive Symptomatology Self-Report) from the original paper (Arjadi, Nauta, Utoyo, & Bockting, 2017)

General acceptability of internet-based interventions for depression

Most participants reported to be open to online interventions, with 73.7% being open to start using internet-based interventions for depression. Moreover, 73.3% and 73% of the participants showed willingness to use it as a substitute for regular treatments and to complement regular treatments respectively.

Factors predicting the use of internet-based interventions for depression

The predictive factors will be presented for behavioral usage intention, substitutive use, and complementary use separately. Table 3.2. presents the intercorrelations of all variables.

Stepwise regression results

Preliminary analyses

For each analysis, the Tolerance was higher than 0.2 and the VIF was <10, indicated the absence of multicollinerarity (Bowerman & O'Connell, 1990; Menard, 2002).

Table 3.2. Correlations

Variable	B.INT	SUBS	COMP	AGE	SEX	EDU	SES	PERC. MH	PERC. MV	DIST	HIST	P.INNOV	IDS-SR
Behavioral usage intention (B.INT)	-	0.56*	0.54*	-0.00	0.17*	0.02	0.00	-0.12*	0.19*	0.05	0.09*	0.47*	0.29*
Substitutive use (SUBS)	-	-	0.62*	0.00	0.05	-0.03	0.01	-0.04	0.19*	0.09*	-0.01	0.49*	0.24*
Complementary use (COMP)	-	-	-	-0.04	0.03	-0.01	-0.01	-0.04	0.17*	0.01	0.08*	0.49*	0.19*
Age (AGE)	-	-	-	-	-0.20*	0.35*	0.39*	0.19*	-0.11*	-0.18*	0.15*	-0.05	-0.19*
Sex (SEX)	-	-	-	-	-	0.05	0.01	-0.14*	0.03	0.11*	-0.00	-0.01	0.20*
Education (EDU)	-	-	-	-	-	-	0.36*	0.15*	-0.10*	-0.15*	0.06	0.01	-0.21*
Socioeconomic status (SES)	-	-	-	-	-	-	-	0.10*	-0.05	-0.08*	0.05	0.02	-0.12*
Perceived mental healthiness (PERC.MH)	-	-	-	-	-	-	-	-	-0.43*	-0.22*	0.02	0.03	-0.60*
Perceived mental health vulnerability (PERC.MV)	-	-	-	-	-	-	-	-	-	0.11*	-0.02	0.19*	0.41*
Distance to mental health service facilities (DIST)	-	-	-	-	-	-	-	-	-	-	-0.07*	-0.03	0.29*
History of mental health service usage (HIST)	-	-	-	-	-	-	-	-	-	-	-	0.01	0.04
Personal innovativeness toward online services (P.INNOV)	-	-	-	-	-	-	-	-	-	-	-	-	0.13*

*significant at $p<0.05$

B.INT (Behavioral usage intention), SUBS (Substitutive use), COMP (Complementary use), AGE (Age), SEX (Sex), EDU (Education), SES (Socioeconomic status), PERC.MH (Perceived mental healthiness), PERC.MV (Perceived mental health vulnerability), DIST (Distance to mental health service facilities), HIST (History of mental health service usage), P.INNOV (Personal innovativeness toward online services), IDS-SR (Depression level; Inventory of Depressive Symptomatology Self-Report).

Factors predicting behavioral usage intention

For the first analysis without including depression level, the results were R^2=0.277, F(5,898)=68.94, p<0.001. We used Bonferroni corrected alpha level of 0.0055 (0.05/9) in the analysis. Personal innovativeness toward online services revealed as the strongest predictor, followed by sex and perceived mental healthiness. Age and history of mental health service usage were not significant predictors based on the Bonferroni corrected alpha level. See Table 3.3a for the details.

Table 3.3a. Regression results for behavioral usage intention (without depression level)

Variable	ΔR^2	B	SE	Beta	t
(Constant)		6.66	0.86		7.73*
Personal innovativeness toward online services	0.222	0.48	0.03	0.48	16.86*
Sex	0.032	1.44	0.24	0.18	6.00*
Perceived mental healthiness	0.012	-0.33	0.08	-0.12	-4.27*
History of mental health service usage	*0.007*	*1.07*	*0.42*	*0.07*	*2.55*
Age	*0.004*	*0.04*	*0.02*	*0.07*	*2.23*

*p<0.0055. The alpha level was adjusted using a Bonferroni correction (α=0.0055). Variables excluded when Bonferroni corrected alpha level applied: history of mental health service usage, age (in italic on Table 3.3a).
Variables excluded from the original regression analysis: education, socioeconomic status, perceived mental health vulnerability, distance to mental health service facilities.

When depression level was included in the analysis at first entry, the results changed into R^2=0.304, F(5,898)=78.43, p<0.001. We used Bonferroni corrected alpha level of 0.005 (0.05/10) which resulted in three significant predictors, namely depression level, personal innovativeness toward online services, and sex. Like in the previous analysis, personal innovativeness toward online services still came up as the strongest predictor followed by depression level. Two predictors (age and history of mental health service usage) which came up from the original results became not significant as we applied the Bonferroni corrected alpha level (see Table 3.3b).

Factors predicting channel preference substitutive use

In the results of analysis without depression level included, personal innovativeness toward online services, distance to mental

health service facilities, and perceived mental health vulnerability came up as three significant predictors of the dependent variable substitutive use (R^2=0.256, F(3,900)=103.36, p<0.001). Bonferroni corrected alpha level of 0.0055 (0.05/9) was used in this analysis and there was no variable excluded based on the Bonferroni corrected alpha level (see Table 3.4a).

Table 3.3b. Regression results for behavioral usage intention (depression level at first entry)

Variable	ΔR^2	B	SE	Beta	t
(Constant)		4.32	0.79		5.48*
Depression level	0.084	0.07	0.01	0.21	7.30*
Personal innovativeness toward online services	0.191	0.45	0.03	0.45	15.95*
Sex	0.018	1.24	0.24	0.15	5.23*
Age	*0.007*	*0.05*	*0.02*	*0.08*	*2.69*
History of mental health service usage	*0.004*	*0.89*	*0.41*	*0.06*	*2.15*

*p<0.005. The alpha level was adjusted using a Bonferroni correction (α=0.005). Variables excluded when Bonferroni corrected alpha level applied: age, history of mental health service usage (in italic on Table 3.3b).
Variables excluded from the original regression analysis: education, socioeconomic status, perceived mental healthiness, perceived mental health vulnerability, distance to mental health service facilities.

Table 3.4a. Regression results for substitutive use (without depression level)

Variable	ΔR^2	B	SE	Beta	t
(Constant)		6.98	0.49		14.31*
Personal innovativeness toward online services	0.238	0.46	0.03	0.47	16.18*
Distance to mental health service facilities	0.011	0.19	0.06	0.10	3.36*
Perceived mental health vulnerability	0.007	0.20	0.07	0.09	2.95*

*p<0.0055. The alpha level was adjusted using a Bonferroni correction (α=0.0055). There was no variable excluded when Bonferroni corrected alpha level applied.
Variables excluded from the original regression analysis: age, sex, education, socioeconomic status, perceived mental healthiness, history of mental health service usage.

Including depression level at first entry into the analysis change the results: R^2=0.283, F(5,898)=70.86, p<0.001. Bonferroni corrected alpha level of 0.005 (0.05/10) was again applied. Depression level and personal innovativeness toward online services reported as significant predictors based on the corrected alpha level. Personal innovativeness toward online services prevailed as the strongest predictor with depression level as the second strongest. Meanwhile, perceived mental

healthiness, distance to mental health service facilities, and age were not significant when the Bonferroni corrected alpha level applied (see Table 3.4b.).

Table 3.4b. Regression results for substitutive use (depression level at first entry)

Variable	ΔR^2	*B*	*SE*	*Beta*	*t*
(Constant)		4.62	0.85		5.44*
Depression level	0.060	0.07	0.01	0.23	6.13*
Personal innovativeness toward online services	0.211	0.45	0.03	0.46	15.96*
Perceived mental healthiness	*0.004*	*0.22*	*0.09*	*0.08*	*2.36*
Distance to mental health service facilities	*0.004*	*0.14*	*0.06*	*0.07*	*2.36*
Age	*0.004*	*0.04*	*0.02*	*0.07*	*2.23*

*p<0.005. The alpha level was adjusted using a Bonferroni correction (α=0.005). Variables excluded when Bonferroni corrected alpha level applied: perceived mental healthiness, distance to mental health service facilities, age (in italic on Table 3.4b).
Variables excluded from the original regression analysis: sex, education, socioeconomic status, perceived mental health vulnerability, history of mental health service usage.

Factors predicting channel preference complementary use

In the analysis excluding depression level, the results were as follows: R^2=0.249, F(3,900)=99.44, p<0.001. We used Bonferroni corrected alpha level of 0.0055 (0.05/9). Personal innovativeness toward online services came up as the only significant predictor based on the Bonferroni corrected alpha level, meanwhile perceived mental health vulnerability and history of mental health service usage reported as not significant (see Table 3.5a).

When depression level was added to the analysis at first entry, the results changed into R^2=0.258, F(3,900)=104.41, p<0.001. Like all previous analyses, here we also used Bonferroni corrected alpha level of 0.005 (0.05/10), and found depression level and personal innovativeness toward online services as significant predictors. Like the previous results with the other two dependent variables, for dependent variable complementary use, personal innovativeness toward online services also remained as the strongest predictor followed by depression level. On the other hand, variable history of mental health service usage became not significant when Bonferroni correction applied. See Table 3.5b for the details.

Table 3.5a. Regression results for complementary use (without depression level)

Variable	ΔR^2	*B*	*SE*	*Beta*	*t*
(Constant)		7.33	0.48		15.15*
Personal innovativeness toward online services	0.238	0.49	0.03	0.47	16.03*
Perceived mental health vulnerability	*0.006*	*0.20*	*0.07*	*0.08*	*2.77*
History of mental health service usage	*0.005*	*1.07*	*0.43*	*0.07*	*2.48*

*p<0.0055. The alpha level was adjusted using a Bonferroni correction (α=0.0055). Variables excluded when Bonferroni corrected alpha level applied: perceived mental health vulnerability, history of mental health service usage (in italic on Table 3.5a).
Variables excluded from the original regression analysis: age, sex, education, socioeconomic status, perceived mental healthiness, distance to mental health service facilities.

Table 3.5b. Regression results for complementary use (depression level at first entry)

Variable	R^2	*B*	*SE*	*Beta*	*t*
(Constant)		7.26	0.47		15.45*
Depression level	0.036	0.04	0.01	0.13	4.35*
Personal innovativeness toward online services	0.218	0.48	0.03	0.47	16.24*
History of mental health service usage	*0.004*	*0.97*	*0.43*	*0.07*	*2.26*

*p<0.005. The alpha level was adjusted using a Bonferroni correction (α=0.005). Variables excluded when Bonferroni corrected alpha level applied: history of mental health service usage (in italic on Table 3.5b).
Variables excluded from the original regression analysis: age, sex, education, socioeconomic status, perceived mental healthiness, perceived mental health vulnerability, distance to mental health service facilities.

Discussion

This study was designed to examine the acceptability of internet-based interventions for depression in an Indonesian sample. The findings showed that the majority of participants (73.7%) indicated they were open to using internet-based interventions for depression. Most participants are also willing to use it as a substitute for regular treatments (73.3%) and to complement regular treatments (73%) respectively. Among all predictors, personal innovativeness toward online services was revealed as the strongest significant predictor for behavioral intention, as well as preferences to use internet-based interventions as a substitute and a complement to regular face-to-face mental health services in Indonesia. Personal innovativeness toward

online services remained the strongest predictor when taking into account the current depression level. Previous research has shown that in general, innovativeness toward technology can strongly predict the technology usage (Lu, Yao, & Yu, 2005; Rai et al., 2013), in line with the results of this study. Therefore, to promote the use of internet-based interventions for depression in Indonesia, it may be a good start to target those who are already currently active as online service users. Via these channels, one may reach people who are innovative and open to new online services offered via the internet. Such promotion of access to internet-based interventions is in line with a previous study reporting that once an individual becomes a user of an internet-based intervention, the person tends to perceive it as more acceptable than non-previous users (Gun et al., 2011).

Other research (in Vietnam) has shown that although people are not aware of the availability of internet-based interventions, they do express that such intervention would be useful, especially when incorporating psychoeducation and the possibility of sharing of information (Sobowale et al., 2016). The same challenge also applied in our study in Indonesia, in that 95% of our participants were unaware of existing internet-based interventions but were willing to try using it. Therefore, promoting internet use in general, followed by promoting access to internet-based interventions, may be a good strategy to stimulate Indonesian people to engage in internet-based interventions for depression and benefit from it.

A recent survey conducted in Europe on the attitudes toward digital treatment for depression reported that digital treatments, including internet-based interventions, were more acceptable for milder forms of depression (Topooco et al., 2017). Unlike the survey results, in this study, higher depression level predicted higher willingness to use the internet-based intervention. Previous research has shown that individuals with current mental health problems tend to be more willing to seek help through the internet even if they do not seek help through regular face-to-face services (Cunningham, Humphreys, Kypri, & van Mierlo, 2006). Such findings may possibly explain why participants with higher depression levels in the current study tended to have higher intention to start using the internet-based interventions

and to use it as a substitute and complement to regular treatments. In line with this idea, when controlling for depression, those who perceived themselves as currently healthy in terms of mental health reported less likelihood to use internet-based interventions. Related, those who reported themselves as vulnerable to experience serious mental health problems in the future reported greater willingness to use internet-based interventions for depression as a substitute for regular treatments.

It is important to note that some participants were unfavorable about the idea of using internet-based interventions for depression. Overall, about a quarter of the sample reported that they were not willing to try using an internet-based intervention or to use it as a substitution for or complement to regular treatments. There are some possible reasons for these findings. From personal situational characteristics, distance to mental health service facilities significantly predicts Indonesian people's willingness to use internet-based interventions for depression as a substitute for regular treatments, but not for the other two dependent variables. These findings suggest that in general, Indonesian people are open to the use of internet-based interventions for depression, but still consider face-to-face contact in mental health services for depression as important, especially when they know where to find them nearby. If they can have access to regular face-to-face treatments, they will choose it over internet-based interventions. This is also in line with previous findings suggesting that health related help via the internet is acceptable but face-to-face contact is still valued as imperative (Sillence, Briggs, Harris, & Fishwick, 2007). Obviously, regular face-to-face treatments remain important to reach more people in Indonesia, first and foremost for those who are not familiar with the internet, but evidently also for some of the people who are actively using the internet like all participants of this study. This means, from the perspective of potential advantages of utilizing e-health in LMICs like Indonesia, regular face-to-face treatments remain necessary, but the availability of internet-based interventions for depression would be acceptable and could improve access to effective treatments for people who are not able to access regular treatments due to the mental health gap.

Of all demographic characteristics, sex was the only independent variable that significantly predicted intention to use internet-based interventions for depression in Indonesia, both when the analyses were and were not controlled for depression level. Female participants reported a higher level of intention to use internet-based interventions for depression than male participants. This can be explained by what has been discussed in previous studies that in general women tend to have higher help seeking patterns than men when they experience mental health problems (Möller-Leimkühler, 2002; Oliver, Pearson, Coe, & Gunnell, 2005). However, sex does not appear as a significant predictor for the channel preferences (substitutive use and complementary use), meaning that sex tends to only affects the first decision to start using the internet-based interventions. Therefore, it might be essential to intentionally do more promotion of internet-based interventions to male population in Indonesia.

This study involved limitations that should be addressed in future research. First, there may be a bias in the sample because we conducted the survey online and thus we cannot generalize the results to people without online access. Nevertheless, even in this group, the level of personal innovativeness toward online services seemed important. Second, the variance of the sample characteristics in this study was not diverse by demographic standards. Most of the participants were young adults, had a relatively high education level, came from middle socioeconomic status, and did not have a history of mental health service usage. This lack of diversity could be the reason why are age, education, socioeconomic status, and history of mental health service usage did not emerge as significant predictors. Therefore, we suggest future research to include a more diverse sample, thus providing the opportunity to see if these characteristics do matter in the context of acceptability of internet-based interventions.

Conclusion

To conclude, although it is certain that regular face-to-face treatments are valued, the majority of Indonesians reported being open to using internet-based interventions for depression. There are two main predictors of intention to start using internet-based interventions

for depression in Indonesia, as well as to use it as a substitute for regular treatments and to complement regular treatments. These predictors include individual disposition of personal innovativeness toward online services and illness characteristics, i.e. higher depression levels. Therefore, to achieve greater adoption of internet-based interventions for depression in Indonesia, it is important to incorporate those aspects during the implementation and dissemination. The hope is that it may eventually increase the potentials of internet-based interventions for depression in Indonesia and reduce the mental health gap in the country.

CHAPTER 4

Self-report assessment to support mental health services: Indonesian version of the Inventory of Depressive Symptomatology-Self Report (IDS-SR)

Arjadi, R., Nauta, M. H., Utoyo, D. U., & Bockting, C. L. H. (2017). The Inventory of Depressive Symptomatology Self Report (IDS-SR): Psychometric properties of the Indonesian version. *PLOS ONE, 12*(10) (e0187009). https://doi.org/10.1371/journal.pone.0187009

Abstract

Background

Depression screening and examination in Indonesia are highly challenging due to the disproportionately low number of mental health professionals in comparison to the Indonesian population. Self-report questionnaires on depression are cost-effective and time-efficient. The current study investigates the psychometric properties of the Indonesian Inventory of Depressive Symptomatology Self Report (IDS-SR).

Methods

The participants were 904 Indonesians (aged 16-61; 50.2% female), recruited via an online survey using Qualtrics. Confirmatory factor analysis of the one-factor, three-factor, and four-factor model were explored. Convergent and divergent validity of the total score of the Indonesian IDS-SR and each factor were examined, as well as the Cronbach's Alpha reliability. In addition, an optimal cut-off score for the Indonesian IDS-SR was established using ROC curve analysis.

Results

The three-factor model of "cognitive/mood", "anxiety/arousal", and "sleep disturbance" was the best fit with the Indonesian IDS-SR data. Convergent and divergent validity were good. Cronbach's Alpha reliability was excellent for the total score, good for the factors "cognitive/mood" and "anxiety/arousal", but insufficient for the factor "sleep disturbance". The optimal cut-off score of the Indonesian IDS-SR was 14, with 87% sensitivity and 86% specificity.

Conclusions

As a multifactorial instrument to measure depression that has good validity and reliability, the Indonesian IDS-SR can be used to assess depressive symptoms for the purpose of research and clinical practice. The optimal cut-off score of the Indonesian IDS-SR is in accordance with the internationally used cut-off score.

Introduction

As one of the most common mental health disorders, depression affects people around the world, including Indonesians. A recent investigation showed that the prevalence of depression in Indonesia is approximately 5% (Ferrari et al., 2013), but there are less than 5 mental health professionals per 100.000 people (World Health Organization, 2015). In Indonesia, it is unlikely that every depressive disorder is formally diagnosed by a trained professional based on a structured clinical interview due to a highly limited human resources, time, and money.

Self-report assessment is useful in detecting depression, and it is cost-effective and time-efficient. Self-reports have been shown to be able to identify depression with some degree of confidence (Stuart et al., 2014). Therefore, the availability of a good quality depression self-report measure can be beneficial under the challenging conditions in Indonesia. However, we are not aware of any freely available Indonesian depression self-report assessment with published psychometric properties that are satisfactory.

There are a number of depression self-report assessments that have been developed worldwide, and are frequently being used in clinical practice and research. The Inventory of Depressive Symptomatology Self Report or IDS-SR (Rush et al., 1986, 1996) is one example of a freely available depression measurement tool with good psychometric properties. It has been used widely in many studies in clinical populations (e.g. Anestis et al., 2009; van Rijsbergen, Kok, Elgersma, Hollon, & Bockting, 2015) as well as in community populations (e.g. Carpenter et al., 2011; Kelly, Tyrka, Anderson, Price, & Carpenter, 2008). The IDS-SR also has been translated and cross-validated into 30 languages. See www.ids-qids.org for all available translated instruments.

To be able to use the IDS-SR in Indonesia, it is first important to check whether the factor structure is comparable to the IDS-SR in other countries. Three different factor models have been proposed for the IDS-SR, namely a one-factor model (Trivedi et al., 2004), a three-factor model (Rush et al., 1996), and a four-factor model (Rush et al., 1986). Next, it is necessary to investigate its reliability and validity, and

also to estimate its optimal cut-off score. Therefore, the current study aims to investigate the factor structure, validity, reliability, and optimal cut-off score of the Indonesian IDS-SR.

Materials and methods

Subjects

The participants were Indonesians age 16 years old and above. There were 1622 individuals viewed the first page of the survey on Qualtrics, and 904 participants (55.7%) completed the survey. The participants' age ranged from 16-61 years (M=27.07, SD=7.06), with 454 females (50.2%).

The sample came from different ethnic groups: 39.2% participants identified themselves as Javanese, 11.8% as Sundanese, 4% as Minangkabau ethnic group, 3.8% as Batakese, and the rest 41.2% were from at least 26 other ethnicity backgrounds. Among the participants, 72% were single, 26.5% were married, 1.5% were divorced/separated/widowed. The participants' education level were below senior high (2.6%), senior high (29.4%), vocational degree (8.6%), bachelor degree (52.7%), and master degree (6.7%). The occupations of the participants were students and college students (31.4%), private and civil employees (31.8%), entrepreneurs (15.7%), and others (21.1%). Most participants lived in Jakarta (32%), Bandung (9.4%), Surabaya (7%), and Yogyakarta (6.4%), while the rest (45.2%) lived in other parts of Indonesia.

Based on the cut-off score of 6 as an indication of being depressed on the Indonesian version of the Beck Depression Inventory I (BDI-I) (Suwantara et al., 2005), total 46.9% participants were categorized as not depressed and 53.1% were categorized as depressed.

Main measure instrument

Inventory of Depressive Symptomatology Self Report (IDS-SR)

The IDS-SR (Rush et al., 1986, 1996) is a 30-item questionnaire measuring depressive symptoms. Each item has four statements that reflect various degrees of symptom severity, scored on a four-point scale from 0 to 3. There are two items about either increase or decrease

in appetite, and two items about either increase or decrease in weight. Only the item with the higher score from both pairs was chosen. The total score is based on 28 items and ranges from 0 to 84.

The original version of the IDS-SR was translated into Indonesian language and then back translated by two independent translators to ensure the translation correctness. Differences between the original version and the back-translated version were discussed with a bilingual clinical psychologist from Indonesia in order to check the expressions according to Indonesian culture.

Instruments for validation

Beck Depression Inventory (BDI, Indonesian version)

The Indonesian BDI (Suwantara et al., 2005) was adapted from the original BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The scale has 21 items. Each item has four to six statements reflecting different degrees of symptom severity, and scored from 0 to 3 depending on the severity. The cut-off score of being depressed for the Indonesian BDI is 6. The reliability as reported by Cronbach's Alpha coefficient of this measure in this study was high (α=0.94).

Positive and Negative Affect Scale (PANAS)

The PANAS (Watson, Clark, & Tellegen, 1998) consists of 10 items that measure positive affects and 10 items that measure negative affects. It has a five-point Likert scale from 1 (very slightly or not at all) to 5 (extremely). The internal consistency was high, α=0.89 for PANAS positive items and α=0.91 for PANAS negative items.

Subjective Happiness Scale (SHS)

The SHS (Lyubomirsky & Lepper, 1999) is a 4-item measure of subjective happiness with seven-point Likert scale. Responses from all items were summed and divided by four to provide a single composite score, ranging from 1 to 7. The SHS reliability was good (α=0.79).

Procedure

This study was part of a longer survey about the acceptability of online interventions for depression in Indonesia. The whole survey was

conducted as a first step in the process of developing an internet-based intervention for depression in Indonesia and testing its effectiveness afterwards in a clinical trial. The output of the current study (the Indonesian IDS-SR) will be used as one of the assessment tools in the clinical trial.

The data collection of this study was conducted through an internet-based platform for surveys (www.qualtrics.com). The recruitment of survey participants was done via invitations on our own study website (www.actandfeel.com), as well as via two other websites focused on mental health issues, online forums about mental health on social media, general social media, and by word of mouth. Consent statements were provided at the beginning of the online survey page and participants could tick an agree button to indicate their agreement. The first author provided her contact information in case the participants had any concerns regarding the study.

This study was approved by Tarumanagara University Human Research Ethics Committee, Indonesia, under project number PPZ20142001. The ethics committee approved the inclusion of participants <18 years old (16-17 years old) without parent/guardian consent.

Data analyses

A confirmatory factor analysis (CFA) was used to test the factor structure of the Indonesian IDS-SR according to the one-factor model of "depression" (Trivedi et al., 2004), three-factor model of "cognitive/mood", "anxiety/arousal", and "sleep disturbance" (Rush et al., 1996), and four-factor model of "mood/cognition", "anxious/hypochondriacal", "endogenous", and "atypical" (Rush et al., 1986). Some items loaded in more than one factor in the original findings of three-factor and four-factor model. In that case, we placed them in the factor of which they had the highest loading coefficient, to ensure that one item only referred to a single factor. The fit of each model was assessed by the following fit indices: CFI (Comparative Fit Index) and RMSEA (Root Mean Square Error of Approximation) as noncentrality-based indices, and SRMR (Standardized Root Mean Square Residual)

and AIC (Akaike's Information Criterion) as absolute fit indices. The rule-of-thumb guidelines to indicate a good fit were defined as: CFI>0.90, RMSEA<0.05, SRMR<0.05 (Hu & Bentler, 1999). It is not possible to directly compare the fit indices of each model if they are not nested on each other. We used the AIC to compare non-nested models, with lower AIC indicating a better fit (Akaike, 1974). The CFA was calculated using R (ver. 3.1.1) with the Lavaan package ver. 0.5–17 (Rossel, 2012). The CFA was estimated through a maximum likelihood procedure with a robust standard error and Satorra-Bentler correction. The CFA model was then plotted with the semPlot package ver 1.0.1 (Epskamp, 2014).

The reliability coefficients of the whole scale and of singular factors were calculated. Bivariate Pearson correlation were used to calculate the convergent and divergent validity of the Indonesian IDS-SR. Convergent validity was calculated by correlating the Indonesian IDS-SR to the Indonesian BDI and the positive affect scale of the PANAS. Divergent validity was assessed by correlating the Indonesian IDS-SR to the negative affect scale of the PANAS and the SHS. Finally, we also conducted a Receiver Operating Characteristic (ROC) curve analysis to test determine the optimal cut-off point of the Indonesian IDS-SR based on the cut-off point of 6 on the Indonesian BDI as an indication of being depressed. The reliability, convergent and divergent validity analyses, and cut-off determination was calculated using IBM SPSS Statistics 22. The anonymized dataset is made publicly available in an online repository.

Results

Confirmatory factor analysis

The fit indices showed that the one-factor and three-factor model possibly fit with the data, but the three-factor model fitted best. The CFA results for the four-factor model could not be interpreted because the covariance matrix was not positive definite: the latent variable "mood/cognition" was linearly dependent on the latent variable "endogenous" (correlation above one). The one-factor model met the sufficient value of RMSEA and SRMR, but not the CFI (RMSEA=0.045, 95% CI=0.042 to 0.048; SRMR=0.041; CFI=0.894). The completely

standardized factor loadings ranged from 0.18 to 0.73, with a mean of 0.55. Meanwhile, the three-factor model met rule-of-thumbs criteria of all fit indices: CFI=0.910, RMSEA=0.041, 95% CI=0.039 to 0.044, and SRMR=0.039. When the models were compared, the three-factor model had the best fit with lowest AIC (52958.64) compared to the one-factor model (53082.95). See Table 4.1 for the descriptive information of the Indonesian IDS-SR total score and each factor score from the three-factor model. Figure 4.1 presents factors loadings for the three-factor model of the Indonesian IDS-SR

Table 4.1. Descriptive of the Indonesian IDS-SR three-factor model

	N=904	
	Range	M (SD)
IDS-SR Total	0-74	18.42 (13)
Factor 1: Mood	0-34	7.27 (6.72)
Factor 2: Anxiety	0-32	7.92 (5.72)
Factor 3: Sleep	0-10	3.23 (2.24)

Reliability

The reliability of the Indonesian IDS-SR was α=0.92. Removal of any of the Indonesian IDS-SR items did not lead to a significant increase of any reliability coefficient, reflecting satisfactory scale homogeneity of the total scale. The reliability coefficients for the separate factors were: α=0.88 (Mood, 12 items), α=0.86 (Anxiety, 12 items), and α=0.38 (Sleep, 4 items).

Convergent and divergent validity

The convergent validity of the Indonesian IDS-SR and each of its three factors were shown by the high positive correlation with the Indonesian BDI and the negative affect scale of the PANAS. The divergent validity was shown by the negative correlation with the positive affect scale of the PANAS and the SHS. The correlations matrix is presented in Table 4.2.

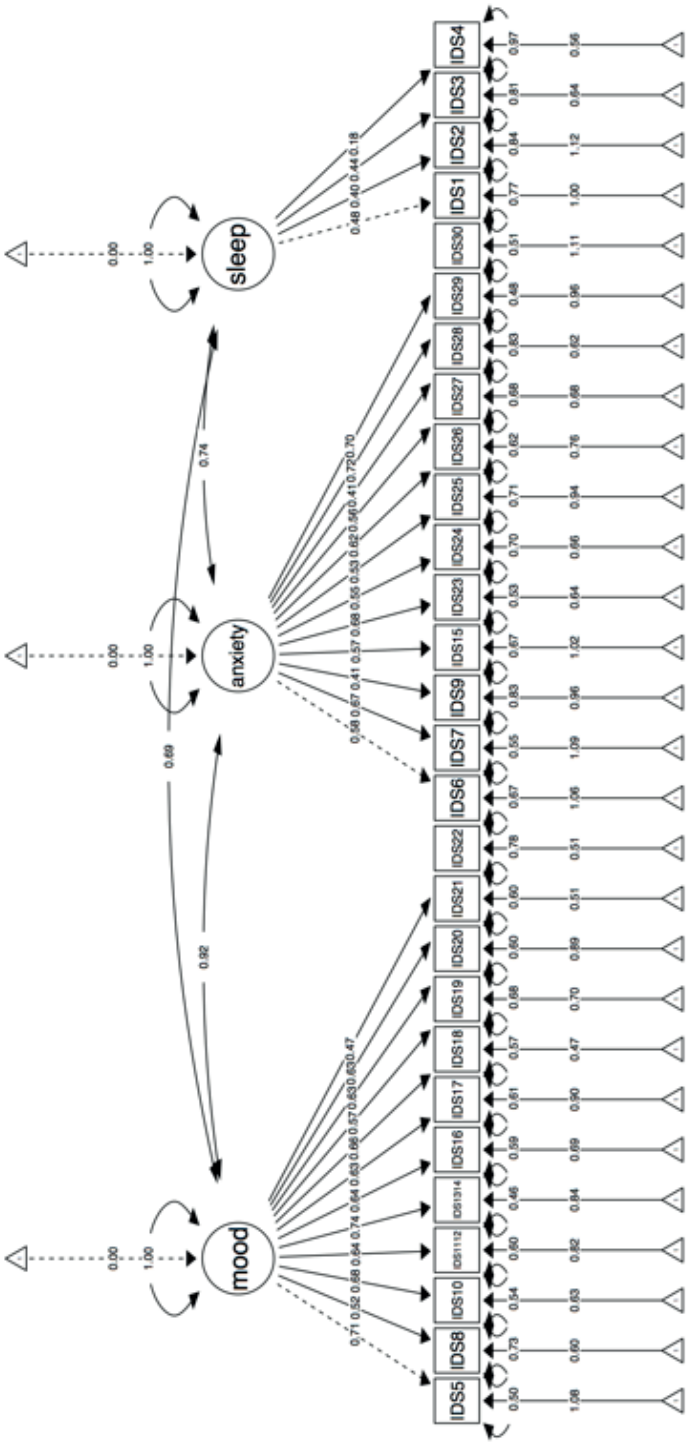

Figure 4.1. Three-factor model with standardized factor loading of the Indonesian IDS-SR

Table 4.2. Correlations

	Indonesian IDS-SR total	Indonesian IDS-SR factors			Indonesian BDI	PANAS (Negative)	PANAS (Positive)	SHS
		Mood	Anxiety	Sleep				
Indonesian IDS-SR total	1	0.94*	0.93*	0.60*	0.89*	0.69*	-0.51*	-0.64*
Factor 1: Mood	-	1	0.80*	0.43*	0.90*	0.64*	-0.58*	-0.67*
Factor 2: Anxiety	-	-	1	0.46*	0.80*	0.69*	-0.40*	-0.54*
Factor 3: Sleep	-	-	-	1	0.43*	0.35*	-0.19*	-0.29*
Indonesian BDI	-	-	-	-	1	0.66*	-0.56*	-0.66*
PANAS (Negative)	-	-	-	-	-	1	-0.34*	-0.58*
PANAS (Positive)	-	-	-	-	-	-	1	0.65*
SHS	-	-	-	-	-	-	-	1

*All correlations were significant at $p<0.05$ (two-tailed)

Optimal cut-off score

The ROC curve analysis using the Indonesian BDI cut-off score (≥6) as the state variable showed that the area under ROC curve (AUC) for the Indonesian IDS-SR was 0.939 (CI=0.925 to 0.954, p=0.000), indicating a high classification accuracy (Fischer, Bachmann, & Jaeschke, 2003; Zweig & Campbell, 1993) (See Figure 4.2). It means the Indonesian IDS-SR was able to differentiate between those who were and were not having a depression. Furthermore, the optimal cut-off score is attained when the weight of sensitivity and specificity is equal (Kumar & Indrayan, 2011). According to this standard, in our sample, the best diagnostic accuracy for the Indonesian IDS-SR was 14, identical with the internationally used cut-off for mild depression (Rush, First, & Burns, 2008). The sensitivity and the specificity were 87% and 86% respectively. See Table 4.3.

Discussion

The results of the study indicate that the Indonesian IDS-SR has good psychometric properties, similar to previous studies in the Netherlands and China (Wardenaar et al., 2010; Wu, Yin, Xu, Carmody, & Morris, 2010). Both the one-factor model and the three-factor

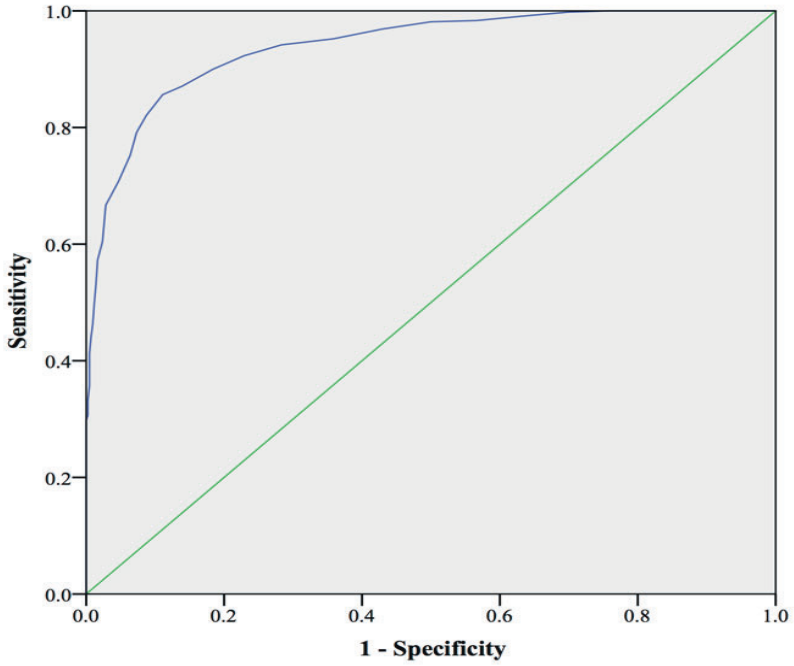

Figure 4.2. ROC curve of the Indonesian IDS-SR

Table 4.3. Sensitivity and specificity values of the Indonesian IDS-SR at different cut-off scores

Cut-off score	Sensitivity (%)	Specificity (%)
6	99	36
7	98	43
8	98	50
9	97	57
10	95	64
11	94	72
12	92	77
13	90	82
14	87	86
15	86	89
16	82	91
17	79	93
18	75	94
19	71	95
20	67	97
21	60	98
22	57	98
23	53	99
24	50	99

model had a good fit with the data, with indications for a better fit of the three-factor solution, also in line with previous findings that compared several factorial structures of the IDS-SR in other countries (González, Boals, Jenkins, Schuler, & Taylor, 2013; Wardenaar et al., 2010). The reliability, convergent and divergent validity were excellent for the total scale and for the "cognitive/mood" and "anxiety/arousal" factors. The "sleep disturbance" factor, however, had a relatively low convergent and divergent validity, as well as low reliability. These results are in line with previous studies indicating that the "sleep" factor may not be sufficient to be used as a subscale. The various sleep problems seem to be quite heterogenic, and the scale does not reflect one single construct (Gili et al., 2011; Rush et al., 1996; Wardenaar et al., 2010). Nevertheless, the three factors altogether are good to measure symptoms of depression.

This study has some limitations. First, based on the Indonesian BDI cut-off score, it can be seen that half of our participants were categorized as depressed. Our current sample may have included more depressed, highly educated, and young participants than a general population due to the recruitment strategy that fully online and partly took place through websites and online forum on mental health, which may have attracted people with (sub)clinical complaints. Therefore, we recommend future studies to replicate this study in a more representative sample from the Indonesian population and compare scores from general population samples and pure clinical samples.

The second limitation is that we used another self-report, which is the Indonesian BDI, as a golden standard to determine an optimal cut-off of the Indonesian IDS-SR. To reconfirm the results, future studies may include a structured clinical interview (e.g. SCID-5 (First, Williams, Karg, & Spitzer, 2015)) as a standard on the diagnosis of depressed and non-depressed participant, and re-evaluate the currently proposed cut-off. Even though we regard our conclusions in this study as prudent based on the Indonesian BDI as the golden standard, we believe that using clinical interviews in future studies would be the best method to affirm the results. In addition, there was no information available on the Indonesian BDI regarding extensive different levels of depression

severity (mild, moderate, severe, very severe) as used in the original IDS-SR, which made it not possible for us to do severity analysis on the Indonesian IDS-SR. Therefore, inclusion of a good severity measure for depression, such as the clinician-administered Hamilton Depression Rating Scale (HAM-D) (Hamilton, 1960) for future studies may also provide additional valuable information and enable further analysis on severity.

For the last limitation, in this study, we were not able to analyze responsiveness to change because we only had single-time data collection. Accordingly, we consider it is important for future research to collect multiple-time data point to allow further analysis on responsiveness to change.

Conclusions

The current study showed that the commonly used three-factor model for the IDS-SR has the best fit for the Indonesian IDS-SR. This study also reported that the Indonesian IDS-SR has good validity, satisfactory reliability, and optimal cut-off score of 14, in line with the internationally used cut-off. Therefore, it can be concluded that the Indonesian IDS-SR is a valuable instrument for assessing depressive symptoms, both in clinical practice and research context.

CHAPTER 5

Trial protocol of a randomized clinical trial for internet-based behavioral activation intervention for depression guided by non-specialists in Indonesia

Arjadi, R., Nauta, M. H., Scholte, W. F., Hollon, S. D., Chowdhary, N., Suryani, A. O., & Bockting, C. L. H. (2016). Guided Act and Feel Indonesia (GAF-ID) - Internet-based behavioral activation intervention for depression in Indonesia: study protocol for a randomized controlled trial. *TRIALS, 17*(455). https://doi.org/10.1186/s13063-016-1577-9

Abstract

Background

Depression is a leading cause of disease burden across the world. However, in low-middle income countries (LMICs), access to mental health services is severely limited because of the insufficient number of mental health professionals available. The WHO initiated the Mental Health Gap Action Program (mhGAP) aiming to provide a coherent strategy for closing the gap between what is urgently needed and what is available in LMICs. Internet-based treatment is a promising strategy that can be made available to a large number of people now that Internet access is increasing rapidly throughout the world. The present study will investigate whether such an internet-based treatment for depression is effective in Indonesia.

Methods

An internet-based behavioral activation treatment, with support by lay counselors who will provide online feedback on the assignments and supportive phone contact to encourage participants to work in the program (Guided Act and Feel Indonesia/GAF-ID), is compared to an online-delivered minimal psychoeducation without any support (psychoeducation/PE). Initial assessment for inclusion is based on a Patient Health Questionnaire-9 (PHQ-9) score of at least 10 and meeting criteria for major depressive disorder or persistent depressive disorder as assessed using the Structured Clinical Interview for DSM-5 (SCID-5). Participants with depression (N=312) will be recruited and randomly assigned to GAF-ID or PE. Overall assessments will be done at baseline, post intervention (10 weeks from baseline) and follow-ups (3 months and 6 months from baseline). The primary outcome is the reduction of depression symptoms as measured by the PHQ-9 after 10 weeks from baseline.

Discussion

To our knowledge, this is the first study in Indonesia that examines the effectiveness of an internet-based intervention for depression in a randomized controlled trial. The hope is that it can serve as a starting point for bridging the mental health gap in Indonesia and other LMICs.

Trial registration

Nederlands Trial Register (www.trialregister.nl): NTR5920, registered on 1 July 2016.

Introduction

Depression is a leading cause of disease burden and health care costs across the world, with approximately 350 million people affected, equivalent to 5% of the world population (World Health Organization, 2008a). In 2006, depression was predicted to be the second largest cause of disease-related disability by 2030 (Mathers & Loncar, 2006). There are many negative consequences of depression, such as impairment of an individual's home and work functioning, an increase of comorbidity from other health problems, and an increase in mortality, partly due to suicide (Herring, Puetz, O'Connor, & Dishman, 2012; Lépine & Briley, 2011). Depression undermines the quality of life of those afflicted, has an emotional and financial impact on their families, and has an economic impact on society at large (Lépine & Briley, 2011).

In almost all countries, the prevalence of depression is associated with the availability of treatment. However, the ability of low-middle income countries (LMICs) to provide access to mental health care for depression is severely limited. A large epidemiological study found that 35.5-50.3% of the people with severe mental disorders in high-income countries (HICs) received no treatment at all in the previous year; meanwhile, the number reached 76.3-85.4% in LMICs (Demyttenaere et al., 2004).

The World Health Organization (WHO) initiated the mental health Gap Action Program (mhGAP) aiming to provide a coherent strategy for closing the gap between what is urgently needed and what is available, with a final goal of reducing the burden of mental disorders worldwide, especially in LMICs like Indonesia, one of the countries identified for intensified support on the WHO mhGAP country list (World Health Organization, 2008a). A recent study on basic health indicators in Indonesia found that the prevalence of depression and anxiety based on self-report is estimated at 6% in adolescents and adults (aged 14 years or older), lower than in most other countries, but still equivalent to approximately 14 million people (Badan Penelitian dan Pengembangan Kesehatan Departemen Kesehatan Republik Indonesia, 2013).

Depression can be treated using a Behavioral Activation (BA) intervention which is known to be a simple yet effective treatment for acute depression (Lewinsohn, 1985). It uses behavioral strategies such as activity scheduling and reengagement in pleasurable and rewarding activities to restore positive mood (Martell, Dimidjian, & Herman-Dunn, 2010). BA has been widely investigated and is applicable to a broad range of populations, including adolescents (Wallis, Roeger, Milan, Walmsley, & Allison, 2012), normal-aged adults (Kanter et al., 2015), and older adults (Lazzari, Egan, & Rees, 2011). It also has been found to be effective for the Latino population in the United States (Kanter et al., 2015) and in one LMIC, India (Chowdhary et al., 2016).
Despite the evidence, delivering BA in a LMIC like Indonesia is rather challenging. The main challenges faced by LMICs in general are low budgets for mental health (World Health Organization, 2011) and the lack of trained professionals outside of urban areas (Eaton et al., 2011; Kakuma et al., 2011; World Health Organization, 2008a, 2013). As in many other LMICs, the availability of psychological interventions in Indonesia is very limited and largely disproportionate between mental health professionals and inhabitants. The proportion of 2.91 mental health professionals for 100,000 inhabitants in Indonesia is even lower than the minimum proportion of 3.33 per 100,000 (World Health Organization, 2008a, 2011). Moreover, in Indonesia, apart from medication, mental health care is usually not covered by medical insurance and is expensive for most people. To counter this, one strategy could be to provide an internet-based intervention. This has been shown to be effective for depression from studies conducted in HICs (Andersson & Cuijpers, 2009; Andrews et al., 2010; Spek et al., 2007) as a relatively low-cost mental health intervention that can be widely distributed, but has been rarely studied in LMICs (Arjadi et al., 2015).

A report from 2014 revealed that 88 million people in Indonesia (34.9% of the population) used the Internet (Asosiasi Penyedia Jasa Internet Indonesia, 2015) and that number is expected to increase to 120 million people (50% of the population) by 2018 (Noviandari, 2014). The Internet is also already used for online support groups of people with mental health problems in Indonesia, such as for mood

disorders and schizophrenia. Therefore, based on the evidence of its effectiveness in HICs and given the limited access to mental health professionals along with the increase of internet usage in Indonesia, internet-based intervention might be a promising treatment for depression in Indonesia.

Internet-based interventions have been found to be particularly effective if therapist support is provided (Spek et al., 2007). However, it is yet unclear whether highly qualified therapists are necessary to provide this support. In fact, there are good examples that face-to-face BA can be delivered by trained nonprofessionals or lay counselors in both a HIC (Ekers et al., 2011) and a LMIC (Chowdhary et al., 2016). Moreover, other than BA, previous studies in other LMICs, Uganda, India, and Pakistan have indicated that lay counselors could successfully deliver effective face-to-face treatments for depression (Bolton et al., 2003; Patel et al., 2010, 2011; Rahman et al., 2008).

For the current study, we adapted a Dutch internet-based BA intervention program for use in Indonesia (Bockting & van Valen, 2015). The participants in this study will be supported by lay counselors under the supervision of a small number of licensed clinical psychologists. We will include lay counselors who do not have any professional clinical experiences and we will train them for the purpose of this particular research. We plan to study the effectiveness of this internet-based BA called “Guided Act and Feel Indonesia” (GAF-ID) as guided by lay counselors. GAF-ID is delivered using a website where the participants are able to access the intervention content. Like any other Internet-based psychological interventions, GAF-ID consists of information presented in an attractive visual format, step-by-step instructions, and a structured format of weekly assignments.

This study will compare the effectiveness of GAF-ID, an internet-based BA with support by lay counselors, to a control group providing online-delivered minimal psychoeducation (PE) without support in the treatment of individuals with a depressive disorder. Our hypothesis is that the GAF-ID will be superior to PE in reducing depressive symptoms in participants with a depressive disorder.

Methods

This study has been designed according to the Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) statement (Chan et al., 2013). Figure 5.1 presents a flow diagram of the study design.

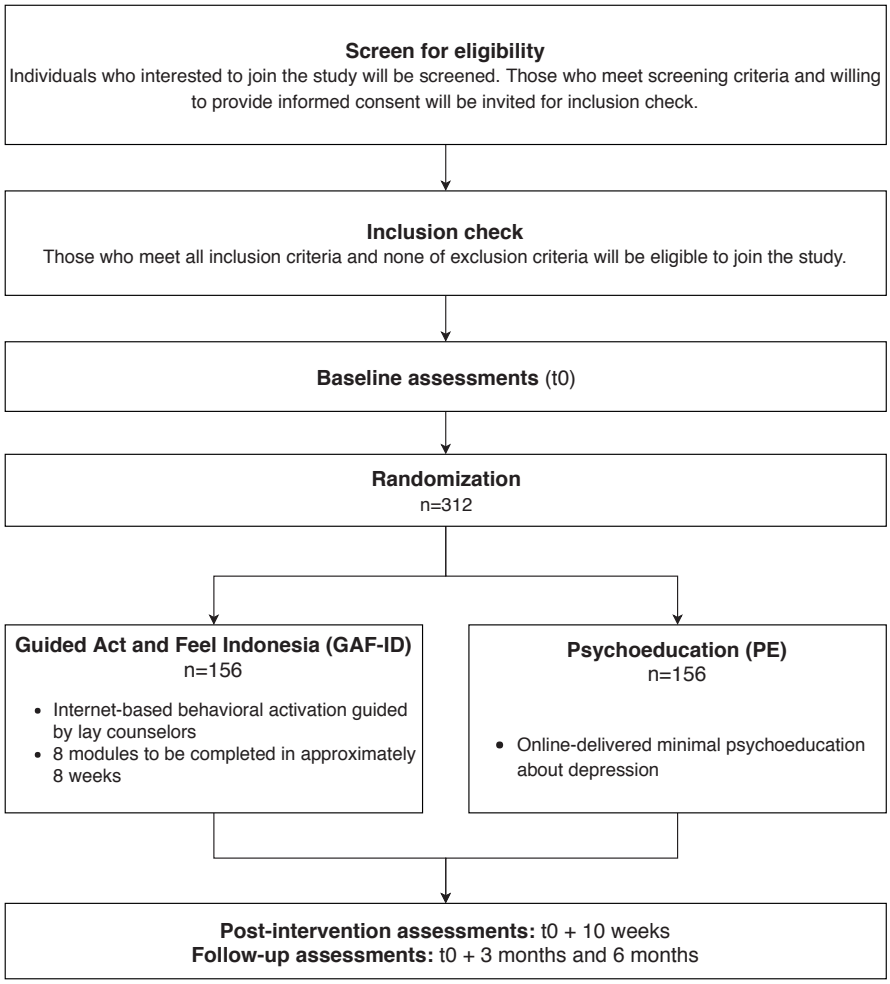

Figure 5.1. Flow diagram

Participants

Recruitment

We aim to recruit 312 participants for this study from the community through advertisements, via the mass media (banners placed in various related websites and places, newspapers and magazines), social media (online groups, pages, and forums related to mental health issues), and referral from mental health institutions or mental health professionals. The potential participants will be able to access information regarding the trial on our study website: www.actandfeel.com and they can fill in the Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al., 2001) for screening purpose on a linked online survey system, the Qualtrics website. If they have scores of at least 10, we will make sure that they understand all aspects of the trial and invite them or their legal guardian to fill in a written informed consent to provide their sociodemographic information and join a clinical interview using the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, fifth edition* (DSM-5) (SCID-5) (First et al., 2015) through a phone call. If they meet all inclusion and none of the exclusion criteria for the study, they are eligible to join the study. The participants will also be informed that each of them who is participating until the last follow-up assessment (6 months from baseline) will receive a monetary incentive, irrelevant of the group to which they belong.

Inclusion criteria

Participants will be included when they meet these following criteria: (1) meet the cutoff score of at least 10 on the PHQ-9 (Kroenke et al., 2001), (2) meet the criteria for a diagnosis of major depressive disorder or persistent depressive disorder on the SCID-5 (First et al., 2015), (3) are aged 16 years or older, (4) are proficient in the Indonesian language, and (5) have fluency to use the Internet. There is no restriction to join the study for participants who have the comorbidity of anxiety as measured using the Fear Questionnaire (Marks & Mathews, 1979) or trauma- and stressor-related disorders as reported on the SCID-5 interview (First et al., 2015).

Exclusion criteria

A potential participant who meets any of the following criteria (as indicated by the SCID-5 (First et al., 2015) will be excluded from participation in this study: (1) current or previous manic or hypomanic episode, (2) current or previous psychotic disorder, (3) current substance use disorder, and (4) acute suicidality. They will then be contacted by a clinical psychologist and provided with appropriate referral information for further treatment. We will also exclude those who (5) currently follow a weekly or more intensive psychological intervention (non-medication) for mental health complaints.

Study design

We will conduct a randomized controlled trial (RCT) in Indonesia with participants being assigned to either an intervention group or a control group. The intervention group will be given the Internet-based BA intervention, supported by lay counselors, called "Guided Act and Feel Indonesia" (GAF-ID). Those in the control group will receive online-delivered minimal psychoeducation (PE) without support. The GAF-ID will be delivered via one secure online platform, at the following address: www.actandfeelindonesia.com. This platform is built by an independent professional intervention website developer in The Netherlands. Meanwhile, the PE will be delivered via a different website: www.actandfeel.com. Each participant will be provided with a personal username and password to either GAF-ID or PE, based on the group to which they are randomized.

Intervention: Guided Act and Feel Indonesia (GAF-ID)

The content of the GAF-ID program is based on the face-to-face BA intervention (Lewinsohn, 1985) and on the Dutch online BA intervention, called "Act and Feel" (Bockting & van Valen, 2015). The GAF-ID is offered in a secure online environment and consists of a series of eight structured modules that can be completed over 8 weeks.

BA is based on the behavioral theory stating that depression is a consequence of low rates of response-contingent positive reinforcement. Therefore, BA concentrates on activating individuals to increase contact with potential reinforcers (Lewinsohn, 1985). The

main focus of BA is to increase potential pleasurable activities that are preplanned and mood-independent in order to enhance mood and thereby overcome depression in the long term. In BA, the participants are first taught to observe their daily mood and behaviors/activities using daily activity monitoring. They are then asked to schedule activities and increase their daily pleasurable activities. Moreover, specific attention will be given to the role of avoidance in depression and how to break the pattern from predominantly reactive behavior towards proactive behavior (Kanter et al., 2012; Lewinsohn, 1985; Martell et al., 2010).

There are some adjustments made from the original "Act and Feel" to make the content of the GAF-ID more accessible for the Indonesian population who may not have very good Internet connections: videos of therapists and case examples were replaced by a series of illustrative pictures and cartoons in an effort to compensate for the low-speed Internet connections in Indonesia. We also adjusted the examples of the assignments and the stories of previous participants' experiences to make them more relevant to Indonesian culture. All adjustments were made based on discussion within the research team, on consultation with clinical psychologists in Indonesia, and on suggestions from lay counselors who support this project. The adjusted version of the program was tested several times in a pilot testing including persons with different characteristics (age, sex, education, occupation, and place of abode) to check the usability, readability and acceptability of the content. More adjustments were made based on the pilot testing results, such as shortened and clarified texts, jargon replaced with easier terms, and the addition of some illustrations to make the program more attractive. However, the sequence and basic content of the eight modules used in the GAF-ID is the same as in the original Dutch version.

Over the eight modules, the main elements are as follows: understanding the basic background of BA and psychoeducation about depression, monitoring mood and behavioral activities, expanding potential mood-independent pleasurable activities, recognizing and overcoming difficulties with expanding activities, realizing the impact

of avoidance behaviors, and building a prevention of relapse strategy. The GAF-ID also provides automatized feedback and automatically graphs mood self-ratings to monitor progress for each participant. Like the original face-to-face BA, the GAF-ID modules follow a fixed structure. Each module starts with a rationale for that module and is followed by specific assignments. Each module can be completed in approximately 30-45 min excluding time to complete assignments. However, there is no time restriction.

Each participant is assigned to a personal lay counselor (supervised by a clinical psychologist) to support the participant in following the online program. Over the course of the program, the lay counselors provide brief feedback online regarding the assignments for each of the eight modules via the online program. In addition, the lay counselors will make brief contact via phone calls to reinforce and encourage participants to work in the online program (weekly during the first 4 weeks and at weeks 6 and 8) in order to enhance adherence to the program and to prevent attrition. The calls do not take more than 20 min each and there is no option for a face-to-face contact.

The GAF-ID program is equipped with a messaging facility that will be used as the main medium of communication between the participants and their lay counselors. The lay counselors log into the GAF-ID program regularly to see the assignments that have been undertaken by the participants and to provide feedback consistent with the BA rationale. If a module has been completed satisfactorily, the lay counselor sends a short message through the GAF-ID program with feedback on the previous module and encourages the participants to engage in the next module. If the participants cannot finish the assignments or seem to not understand the instructions, they can send a message to their lay counselors, and the lay counselors will provide assistance. Further, the lay counselors can see the log-in history of the participants they have assisted, and can send reminders via email and text message to those participants who do not log in to the program each week. Phone calls will follow if the participant fails to reinitiate the intervention after one more week.

All lay counselors will work under the supervision of licensed clinical psychologists and regularly report on the participant's progress to them as their supervisors. The lay counselors present their cases to their supervisors and address concerns in regular weekly supervision.

Control condition: online-delivered minimal psychoeducation (PE)

In the PE group, as an active comparison condition, the minimal PE is presented as a short, online leaflet consisting of basic information about depression and basic tips on how it can be addressed, representing information that can be easily and freely accessed online outside of this program. Participants in the PE group will receive neither assistance from lay counselors nor from clinical psychologists, but provided with the same assessments as the intervention group.

Support

Lay counselors

We plan to recruit 20-30 persons to serve as lay counselors for this study. Our lay counselors meet the following criteria: (1) age between 20 and 40 years with no restriction on gender, (2) minimum senior high school education, (3) willing to participate fully during the trial process, (4) no professional background as a mental health specialist, and (5) willing to participate in the training for lay counselor in this study.

The focus of the lay counselors' support is to help each participant follow the GAF-ID program by (1) explaining to the participants how GAF-ID works, (2) providing technical assistance for participants, (3) providing short feedback to each of the completed modules, and (4) reminding participants to complete each online module. The lay counselors will not provide any additional counseling.

All lay counselors receive two days of intensive training during which all features of the internet-based BA are discussed and role-plays are conducted. Other technical issues addressed during the training include how to handle technical problems that may arise, how to handle participants with low motivation, and how to monitor suicidality or other serious deteriorations during the intervention. They will receive printed training modules to help them do their tasks during the trial.

To promote treatment integrity and consistency, we provided, apart from the two days of training, a treatment guidance protocol, a weekly structured support checklist, a participant's short progress report template, and regular supervision by a clinical psychologist. In order to elicit and to monitor adherence, the lay counselors will fill out a weekly structured checklist on the support that they have given to each participant. To assure integrity and consistency further, the lay counselors will also be asked to write a regular short progress report on each participant. They will give both the checklist and the report to the clinical psychologists who supervised them. The clinical psychologists will then provide necessary feedback and consultations.

Clinical psychologists

We plan to recruit 10-15 clinical psychologists to provide clinical supervision to the lay counselors in this trial. Each clinical psychologist will supervise three to five lay counselors. All clinical psychologists will be graduates from a formal clinical psychology program and need to be licensed as clinical psychologists in Indonesia. The clinical psychologists will receive a weekly structured support checklist and a short report of participants' progress from the lay counselors under their supervision that they can discuss together in the regular supervision meetings.

Similar to what is provided for the lay counselors, the clinical psychologists will be provided with two days of intensive training on the GAF-ID program and a printed version of the training module. The training is given to make sure that the clinical psychologists are familiar with the program and can provide necessary supervision to the lay counselors.

The clinical psychologists will only have contact with participants in case of a suicidal crisis and other serious deteriorations, through phone calls. They will be equipped with the standardized procedure on when and how they should do suicide risk assessment and handle serious participant deteriorations within this trial.

Outcome assessments

There will be several points of assessment conducted during this study: baseline, post intervention (10 weeks from baseline), and

follow-ups (3 months and 6 months from baseline). There will also be a biweekly (once every 2 weeks) assessment in between. All self-report assessments will be conducted through the Qualtrics website, with a private link delivered to the participant's personal email at each time point. See Table 5.1 for the details.

Primary outcome

The primary outcome is self-reported depressive symptoms based on the Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al., 2001) at post intervention (10 weeks from baseline). However, overall during the study, it will be administered at baseline, post intervention (10 weeks from baseline), follow-ups (3 months and 6 months from baseline), as well as biweekly during the 8-week intervention period.

Secondary outcomes

Secondary outcomes will include: (1) rate of remission/recovery of depression (major depressive disorder or persistent depressive disorder) using the Structured Clinical Interview for DSM-5 (SCID-5) (First et al., 2015), (2) the Inventory of Depressive Symptomatology Self-Report (IDS-SR) (Arjadi et al., 2017; Rush et al., 1986, 1996), (3) the Fear Questionnaire (FQ) (Marks & Mathews, 1979), (4) the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988), and (5) The brief version of the WHO Quality of Life (WHOQOL-BREF) (WHOQOL Group, 1998).

Potential mediators and moderators

For potential moderators and mediators of the outcome, we will assess: (1) a Visual Analogue Scale (VAS) of mood (one-item mood scale) (van Rijsbergen, Bockting, Berking, Koeter, & Schene, 2012), (2) the Positive and Negative Affect Scale (PANAS) (Watson et al., 1998), (3) the Behavioral Activation for Depression Scale Short Form (BADS-SF) (Manos, Kanter, & Luo, 2011), (4) the Life-events scale (Garnefski, Kraaij, & Spinhoven, 2001), (5) history of depressive disorders (major depressive disorder and persistent depressive disorder) and trauma- and stressor-related disorders as assessed using the SCID-5 interview (First et al., 2015), and (6) our self-developed Childhood trauma.

Table 5.1. Assessments

Measures	Description	Baseline	2 weeks	4 weeks	6 weeks	8 weeks	10 weeks (post-treatment)	3 months (follow-up)	6 months (follow-up)
Primary measure									
PHQ-9	Depression symptoms level	+	+	+	+	+	+	+	+
Secondary measures									
SCID-5 (interview)	Current depressive disorder (major depressive disorder and persistent depressive disorder)	+					+		
IDS-SR	Depression symptoms	+					+	+	+
FQ	Fear and avoidance	+					+	+	+
MSPSS	Perceived social support	+					+	+	+
WHOQOL-BREF	Quality of life	+					+	+	+
Potential mediators and/or moderators									
VAS	General mood condition	+	+	+	+	+	+	+	+
PANAS	Positive and negative affects	+	+	+	+	+	+	+	+
BADS-SF	Behavioral activation	+	+	+	+	+	+	+	+
Life-events	Life events	+							
SCID-5 (interview)	• History of depressive disorders (major depressive disorder or persistent depressive disorder) • Trauma- and stressor-related disorders	+							
Childhood trauma (interview)	History of childhood trauma	+							
Additional descriptive measures									
MEIM	Multigroup ethnic identity measure	+							
Demographics	Sociodemographic characteristics	+							
Clinical information	Information related to clinical conditions	+							

BADS-SF (Behavioral Activation for Depression Scale Short Form), FQ (Fear Questionnaire), IDS-SR (Inventory of Depressive Symptomatology Self-Report), MEIM (Multigroup Ethnic Identity Measure), MSPSS (Multidimensional Scale of Perceived Social Support), PANAS (Positive and Negative Affect Scale), PHQ-9 (Patient Health Questionnaire-9), SCID-5 (Structured Clinical Interview for DSM-5), VAS (Visual Analogue Scale), WHOQOL-BREF (The brief version of the WHO Quality Of Life).
The time frames of 2 weeks, 4 weeks, 6 weeks, 8 weeks, 10 weeks, 3 months, and 6 months are counted from baseline (applied in both groups).

Additional measures

For additional measures, since Indonesia is rich in cultural diversity, we will collect data on ethnic identity using the Multigroup Ethnic Identity Measure (MEIM) (Phinney, 1992). We will also examine

sociodemographic characteristics (i.e. age, gender) and clinical information (i.e. depression attribution, psychiatric-related health care consumption) in each participant.

Main study hypotheses

That participants receiving the GAF-ID will have a lower level of depression symptoms on the PHQ-9 (Kroenke et al., 2001) at the main time point of measuring effectiveness after 10 weeks from baseline (post intervention) compared to participants in the PE group. The lower level of depression symptoms measured using the same tool is also expected to present in the GAF-ID arm relative to the PE arm at the 3-month and 6-month follow-ups.

Furthermore, the incidence of major depressive disorder and persistent depressive disorder measured using the SCID-5 (First et al., 2015) is expected to be lower in the GAF-ID group compared to the PE group at post intervention and follow-ups, along with lower depressive symptoms measured using the IDS-SR (Arjadi et al., 2017; Rush et al., 1986, 1996), lower anxiety levels measured using the FQ (Marks & Mathews, 1979), higher perceived social support as measured by the MSPSS (Zimet et al., 1988), and higher quality of life as measured by WHOQOL-BREF (WHOQOL Group, 1998).

All potential moderators are hypothesized to predict outcome measures, whereas potential mediators are supposed to underlie the reduction in depression symptoms. Moreover, ethnic identity, sociodemographic characteristics and clinical information will be examined as additional data.

Power calculation

Psychoeducation has been used as the comparator in some online and non-online depression treatment trials with effect sizes ranging from 0.03 to 0.85 (Austin et al., 2008; Chiesa, Mandelli, & Serretti, 2012; Mackinnon, Griffiths, & Christensen, 2008). Given the fact that we plan to perform this study in a unique target population (a LMIC), the statistical power was calculated to estimate a rather conservative small to medium effect size. The power is calculated to detect differences between two independent groups, in a two-sided

test at alpha=0.05 and a power of (1-beta)=0.80, for an effect size of 0.35 (small to medium effect size). Based on these parameters, we will need a sample of 260 participants. To compensate for the expected 20% attrition we will need to include and randomize 312 participants at baseline.

Randomization and blinding

As participants are screened into the study, they will be randomized using a web-based program that was built for this trial. Randomization will be performed within in a permuted block design. The size of the blocks and the exact strata are not revealed in this design paper, so that the underlying algorithm remains unpredictable for the research assistants, but it is stated on the trial registration. This study is single-blind: the research assistants, who will be involved in conducting the clinical interviews after randomization, will be blind to the treatment condition and the participants will be asked not to reveal their treatment condition during the interview. Research assistants who perform the assessments are not involved in the intervention process and they will be asked to guess the treatment allocation per participant.

Analysis

Primary analysis

The primary analysis will be conducted on an intent-to-treat basis, including all participants randomized to the study regardless of treatment adherence or attrition or the completion of outcome assessments. The PHQ-9 (Kroenke et al., 2001) will serve as the primary outcome measure with the main time point of effectiveness at post intervention (10 weeks from baseline). Prior to the effect analyses the baseline comparability of the two groups in terms of prognostic variable distributions will be checked. If, despite randomization important differences exist, these variables will be adjusted for in the analyses by their inclusion as covariates.

Each repeated outcome measure will be analyzed as a dependent variable using linear mixed models for fixed (treatment) and random effects models (participant) for independent variables. These models are superior for the analysis of longitudinally correlated data (within

subjects) and can optimally deal with missing values, i.e. they prevent complete-case bias by incorporating all available data. In these analyses, a treatment × time interaction term will represent the effect of the intervention on the change of the outcome variable over time. Effect modification of treatment by potential moderators will be studied by including interaction terms of treatment times the moderator variable and testing their statistical significance. Potential mediation of the effect of treatment will be studied using the mediation model proposed by Preacher and Hayes (Hayes, 2009). All effects parameters will be supplied with a 95% confidence interval. The two-sided significance level will be set at p=0.05.

Other analyses

All other measures will be analyzed as other analyses. The analyses will also be conducted on the participants who complete treatment, with completion being defined as finishing at least five of the eight modules of the GAF-ID. Potential selection bias associated with completion will be corrected by including unequally distributed baseline prognostic variables as independent variables in the models. We will also perform responder analysis to investigate the number of patients who recover from depressive disorder in the intervention group and the control group based on the SCID-5 interview (First et al., 2015).

Additionally, we also are interested in further analysing ethnic identity that might have specific impact on depression among Indonesians. Culture is one of the factors that has been reported to contribute to the experience and symptoms of depression (Kleinman, 2004). For this purpose, the ethnic background from each participant will be reported, and particular participants with a strong ethnic identity shown by a high score on the MEIM (Phinney, 1992) will further be profiled on their depression symptoms.

Suicidality and serious deterioration

Suicidal thoughts and tendencies will be assessed biweekly in both conditions using the PHQ-9 (Kroenke et al., 2001) during the study. Participants scoring at least 2 on the suicide item “Thoughts that you

would be better off dead or of hurting yourself in some way" twice in a row will be contacted by a clinical psychologist via a phone call for suicide risk assessment. Moreover, serious deterioration will be detected via the biweekly measures: in case an increase in depression level measured by the PHQ-9 (Kroenke et al., 2001) occurs (score increase by at least 5 points with a total score of at least 15 points) and this increase is still present or even more pronounced 2 weeks later, participants will be contacted by a trained research assistant for an IDS-C interview (Rush et al., 1996) via a phone call. If the score is at least 24, then a SCID-5 interview (First et al., 2015) on depression and screening for other potential deteriorations will follow. A full SCID-5 interview (First et al., 2015) for specific section will be followed if the participants answer "yes" to either of the screening questions.

For both treatment conditions, in case of severe suicidality and serious deterioration, more intensive treatment may be required and the participant may need to be referred to a mental health professional. They will be provided with appropriate referral information when necessary. However, all participants will be asked to continue with the intervention and the assessments.

At post intervention (10 weeks from baseline), as an outcome assessment, we will conduct the SCID-5 interview (First et al., 2015) on depression. At this point, we will also use the SCID-5 (First et al., 2015) to screen for other deteriorations in all participants, followed by the full section interview if the participants answer "yes" to either of the screening questions. The same referral procedure will be applied if any serious deterioration is found.

Discussions

To our knowledge, this will be the first study in Indonesia that investigates the effectiveness of an internet-based psychological intervention for depression in a RCT. This trial offers new avenues for mental health treatments in LMICs, using Internet and additional support via an online voice call or phone call by lay counselors. If this intervention is effective, this treatment strategy can widen access for mental health services to many people from different locations in

Indonesia.

Furthermore, it has been reported that the effect of an internet-based cognitive-behavioral intervention for depression is still effective until 12 months after the intervention termination (Mackinnon et al., 2008). In this study, with assessments at post intervention (10 weeks from baseline) and follow-ups (3 months and 6 months from baseline), we will be able to assess the impact of this internet-based behavioral activation intervention on depression in the longer term, including the impact on secondary outcomes. This study might be a starting point for showing the potential of using Internet-based intervention, and internet-based BA in particular, to reduce the gap in mental health services availability in LMICs.

We also will try to identify factors that might contribute to depression and its recovery by collecting data regarding common comorbidity and other factors related to depression. It will provide information about the factors that require more attention in tailoring the internet-based therapy program and implementing such an indicated intervention for depression in Indonesia.

CHAPTER 6

Effectiveness of an internet-based behavioral activation intervention for depression guided by lay counselors in Indonesia: a randomized clinical trial

Arjadi, R. , Nauta, M. H., Scholte, W. F., Hollon, S. D., Chowdhary, N., Suryani, A. O., Uiterwaal, C. S. P. M., Bockting, C. L. H. (2018). Internet-based behavioural activation with lay counsellor support versus online minimal psychoeducation without support for treatment of depression: a randomised controlled trial in Indonesia. *Lancet Psychiatry.* https://doi.org/10.1016/S2215-0366(18)30223-2

Abstract

Background

Depression is one of the leading contributors to the global burden of disease. However, treatment availability is often very poor in low-income and middle-income countries. In a randomized clinical trial, we investigated the efficacy of internet-based behavioral activation with lay counselor support compared with online minimal psychoeducation without support for depression in Indonesia (a middle-income country).

Methods

We did a community-based, two-group, randomized controlled trial in Indonesia. Eligible participants were aged 16 years or older, scored 10 or above on the Patient Health Questionnaire 9 (PHQ-9), met the criteria for major depressive disorder or persistent depressive disorder based on the Structured Clinical Interview for DSM-5, were proficient in Bahasa Indonesia, and could use the internet. Participants were randomly allocated (1:1) by a research assistant using a web-based randomization program to internet-based behavioral activation with lay support (termed Guided Act and Feel Indonesia [GAF-ID]) or online psychoeducation without further support (termed Psychoeducation [PE]). Randomization was done within a random permuted block design and was stratified by sex and depression severity (i.e. PHQ-9 10-14 vs ≥15). The primary outcome was self-reported PHQ-9 score at 10 weeks from baseline. Research assistants were masked to group allocation until after the assessment of the primary outcome. Interventions were described to participants during the consent procedure and after randomization, but no indication was given as to which was the intervention of interest and which was the control. Analysis was by intention to treat. The trial was registered in the Netherlands Trial Register, number NTR5920. It is closed to new participants, and follow-up has been completed.

Findings

Between Sept 6, 2016, and May 1, 2017, 313 participants were enrolled and randomly assigned, 159 to the GAF-ID group and 154 to the PE group. At 10 weeks, PHQ-9 scores were significantly lower in the GAF-

ID group than in the PE group (mean difference -1.26 points [95% CI=-2.29 to -0.23]; p=0.017), and participants in the GAF-ID group had a 50% higher chance of remission at 10 weeks (relative risk 1.50 [95% CI=1.19 to 1.88]; p<0.0001). An effect size of 0.24 for the GAF-ID group compared with the control group at 10 weeks was sustained over time (effect size 0.24 at 3 months, and 0.27 at 6 months). No adverse events were reported in either group.

Interpretation

To our knowledge, ours is the first adequately powered randomized clinical trial of an internet-based intervention for depression in a low-income or middle-income country. Internet-based behavioral activation with lay counselor support efficaciously reduced symptoms of depression, and could help to bridge the mental health gap in LMICs.

Introduction

Depression is a common mental health condition that not only impairs daily functioning, but also has negative effects on society and economic output (World Health Organization, 2017). Depression affects approximately 4.4% of the world's population and is one of the leading causes of the global burden of disease (World Health Organization, 2008a, 2017). In low-income and middle-income countries (LMICs), the prevalence of depression is reported to be around 4.2% (World Health Organization, 2017). However, treatment availability is far from ideal in many countries, and especially in LMICs, an issue known as the mental health gap (World Health Organization, 2008a). LMICs often have poor access to essential psychopharmacological treatments and have fewer mental health professionals available per inhabitant compared with high-income countries. Furthermore, the distance to mental health-care facilities can be large. According to a report published in 2016 (Patel et al., 2016), India and China, the two most populous countries, have deficits of more than 90% in availability of mental health treatment.

The need to promote treatment availability for mental health problems in Indonesia is widely recognised, and Indonesia is one of the LMICs listed in WHO's mental health Gap Action Program (World Health Organization, 2008a). The point prevalence of depression in Indonesia is approximately 3.7% (World Health Organization, 2017), but the availability of mental health workers is low, 3.1 per 100 000 people (World Health Organization, 2015). This availability is in line with that in most other LMICs, but substantially lower than that in high income countries (e.g. 45.7 per 100 000 in the Netherlands, 125.2 per 100 000 in the USA, and 318.9 per 100 000 in the UK) (World Health Organization, 2015). Furthermore, because Indonesia is an archipelago with five big islands and more than 1000 smaller islands, mental health facilities are unequally distributed. Therefore, innovative strategies to address the mental health gap and increase access to treatment in Indonesia might be useful, e.g. use of technology to facilitate access, in combination with delivery by non-specialists (Bockting et al., 2016).

Guided Act and Feel Indonesia (GAF-ID) is an internet-based intervention for depression that is guided by trained lay counselors and based on a treatment protocol of behavioural activation that has been adapted for the Indonesian context (Arjadi et al., 2016). Behavioural activation is an effective treatment for depression compared with control conditions (i.e. waitlist and other non-treatment options, including minimal contact and placebo) according to the results of a meta-analysis, which showed a standardised mean differences effect size of 0.78 (Mazzucchelli, Kane, & Rees, 2009). It can be feasibly delivered via the internet in high-income countries (Carlbring et al., 2013). However, a 2018 meta-analysis showed that, when corrected for biases (i.e. risk of bias, publication bias, and exclusion of waitlist control group), the effect size (Hedges' g) of psychological interventions for depression ranged from 0.24 to 0.38 compared with care as usual and other non-waitlist control conditions (Cuijpers, Karyotaki, Reijnders, & Ebert, 2018). The deployment of lay counselors to deliver behavioural activation was feasible in India in a study in which the addition of behavioural activation delivered by lay counselors to enhanced usual care was more efficacious than enhanced usual care alone (Patel et al., 2017). The use of lay counselors is particularly noteworthy in view of the scarcity of available resources (World Health Organization, 2008a).

The internet has been successfully used as the delivery medium for behavioural activation in high-income countries (Josephine, Josefine, Philipp, David, & Harald, 2017). However, its potential is still neglected in LMICs, although access is growing, which makes internet-based interventions increasingly feasible. 132.7 million people in Indonesia (roughly 50% of the population) use the internet (We Are Social, 2018a), and the number is increasing. The authors of a narrative systematic review (Naslund et al., 2017) identified 49 studies in which digital technologies (mobile, online, or other technology including mobile phones, smart phones, internet-based programs, telepsychiatry, text messaging, remote sensing, wearable devices, and mobile applications) were used in the context of mental health care in LMICs: 13 studies of support for clinical care and education of health workers, four studies of assessment, 13 studies of treatment adherence and support for recovery, 13 studies of self-help, and six

studies of treatment and prevention of substance use. In terms of internet-based intervention studies specifically, the review included two small randomized controlled trials (Burton et al., 2016; Mogoaşe et al., 2013) of treatment of depression or depressive symptoms, both done in Romania. In one (n=42) (Mogoaşe et al., 2013), online concreteness cognitive training was compared with waitlist (Cohen's d=-0.16); in the other (n=27) (Burton et al., 2016), online cognitive behavioural therapy was compared with treatment as usual (Cohen's d=0.49). In general, study quality and the mental health problems that were targeted varied substantially among included articles, and the authors of the review concluded that continued research is needed to rigorously assess the effectiveness of digital innovations in LMICs (Naslund et al., 2017).

In this randomized clinical trial, we examined the efficacy of GAF-ID compared with online psychoeducation delivered without support (PE). We hypothesised that, compared with PE, GAF-ID would more efficaciously reduce depressive symptoms (our primary outcome).

Methods

Study design and participants

We did a community-based, country-wide, two-group randomized controlled trial in Indonesia. Eligible participants were aged 16 years or older, scored 10 or above on the Patient Health Questionnaire 9 (PHQ-9; the standard cut-off recommended in the PHQ-9 manual, with sensitivity of 88% and specificity of 88% for major depression (Kroenke et al., 2001), met the criteria for major depressive disorder or persistent depressive disorder based on the Structured Clinical Interview for DSM-5 (SCID-5), were proficient in Bahasa Indonesia, and could use the internet. Exclusion criteria (all based on SCID-5) were current substance use disorder, current or previous manic or hypomanic episodes or psychotic disorder, and acute suicidality (defined as a suicide plan with preparatory behaviour). People who were currently being seen at least weekly for psychological interventions were also excluded. Current medication treatment for mental health problems was allowed, and was checked at enrollment and again during the final interview.

The trial protocol is publicly available (Arjadi et al., 2016), and the trial was preregistered. The Tarumanagara University Human Research Ethics Committee (PPZ20152002), and the Research Ethics Committee at the Institute of Research and Community Service, Atma Jaya Catholic University of Indonesia (942/III/LPPM-PM.10.05/09/2016) provided ethical approval for the study. Active written informed consent was obtained online before randomization from all participants via Qualtrics. For participants younger than 18 years, online active written informed consent was also provided by their legal guardians.

Randomization and masking

Participants were recruited from the Indonesian community through mass media advertisements (banners placed in various websites and places throughout the country), social media (online communities, forums, and pages about mental health), and referral from mental health institutions or mental health professionals (both flyers and word of mouth). Potential participants could access extensive information on the trial website (www.actandfeel.com), and, if they were interested, could complete the screening assessment (PHQ-9) via a linked Qualtrics online survey platform. No face-to-face screening methods were used. Those who scored 10 or higher were then contacted via email to make sure that they understood all aspects of the trial and, if so, were invited to join a clinical interview, in which SCID-5 was administered via phone calls by trained clinical interviewers with a minimum of a Bachelor's degree in psychology.

Participants were randomly allocated (1:1) by a research assistant to GAF-ID or PE via a web-based randomization program built by an independent developer for this trial. Randomization was done within a random permuted block design stratified by sex and depression severity (score 10-14 *vs* score ≥15 on PHQ-9). The stratification variables were chosen a priori as possible moderators of treatment effects. Within each of the four sex-severity strata, randomization was done in random sized blocks of 8-16 participants. None of the research assistants, including the assistant who did the randomization, were informed about the random size of the blocks and exact strata, to ensure that the underlying algorithm remained unpredictable.

The two interventions were described to participants during the consent procedure, but no indication was given as to which was the intervention of interest and which was the control. After randomization, participants were given more detailed descriptions of the group to which they were assigned, but still no indication of which was the intervention of interest and which was the control.

The research assistants who did the clinical interviews after randomization were not involved in the intervention process and were masked to participants' treatment condition (participants were also asked not to reveal their treatment condition during the interviews). At the end of the final interview (10 weeks after baseline), research assistants were asked to guess the treatment allocation of each participant they interviewed, and were then no longer blinded to allocation. All subsequent assessments were self-reported.

Procedures

Participants in the GAF-ID group received an internet-based behavioural activation intervention supported by lay counselors. The intervention was made available via a secure online platform (www.actandfeelindonesia.com), which was built by an independent professional intervention website developer in the Netherlands. Each participant was provided with a personal username and password to log in to the program, which could be accessed on a tablet, mobile phone, or computer (the interface display worked best on a computer). The GAF-ID program was adapted from the original Dutch version of an online behavioural activation intervention, *Doe en Voel* (which translates as Act and Feel) (Bockting & van Valen, 2015). The content was based on Lewinsohn's theory that depression results from low rates of response-contingent positive reinforcement. It focuses on monitoring of daily mood and activities, followed by encouraging users to do pleasurable, mood-independent, pre-planned activities (Lewinsohn, 1985). The program consists of a series of eight weekly structured modules that can be completed in 30-45 min per module, including psychoeducation about depression and the basic background of behavioural activation, monitoring mood and behaviour or activities, expansion of potential mood-independent pleasurable activities and

overcoming the difficulties during the process, getting insight into the effect of avoidance behaviour, and building a strategy for relapse prevention (Arjadi et al., 2016).

After discussions within the research team and suggestions from the Indonesian clinical psychologists and lay counselors who worked on this study, we made some practical and cultural adaptations to the program before the start of the study, although these changes did not affect the sequence or basic content of the modules. Because of the low speed of Indonesian internet connections, we replaced therapist video clips and client example videos with a series of illustrations. We changed the examples of assignments used to make them fit better with Indonesian culture (e.g. going to the market instead of walking your dog in the park). Text fragments were shortened as much as possible and were sometimes replaced with cartoons. People of various ages, sexes, and education levels tested the adapted version for acceptability and usability. Based on their feedback, we made additional adaptations to the wordings, shortened texts further, and added more cartoons. All participants in the GAF-ID group used this final version.

Lay counselors provided guidance to each participant in the GAF-ID group. Lay counselors were supervised by a licensed clinical psychologist during their work. A detailed description of the recruitment and training of the lay counselors and clinical psychologists is provided in the trial protocol (Arjadi et al., 2016). Lay counselors provided more explanation about the assignments if needed, gave feedback on assignments for each module (approximately 30-60 min per week for each participant), and reminded participants weekly to log in to the program regularly (via online messaging, chat, or email). Contact was made mainly via the intervention platform's messaging facility, but other methods outside the platform could be used (e.g. chat, email) if participants preferred. To encourage adherence, lay counselors also made several pre-planned brief contacts (20 min maximum) via phone calls during the intervention process (weekly during the first 4 weeks, at week 6, and at week 8). No face-to-face contact took place. The lay counselors sent weekly reports about participants' progress to the supervising clinical psychologists. They discussed difficulties

and challenges in supporting participants, for instance, issues of low motivation and suicidality with the supervising psychologists during regular supervision meetings (approximately 30-60 min per week per counselor). Lay counselors could also contact clinical psychologists via email or chat for brief discussions when necessary.

Participants in the PE group were provided with a personal username and password to access a different platform comprising basic psychoeducation about depression and simple tips on how to handle the condition in general. The same psychoeducation was also integrated into the first module of GAF-ID. The online psychoeducation platform was compiled from freely accessible online sources, which we translated into Bahasa Indonesian. No lay support was provided to the participants in this group. Reimbursement for the cost of internet access was provided to participants in both groups, when necessary.

All participants underwent identical self-report assessments at baseline and every 2 weeks thereafter up to the main post-test assessment at week 10, with follow-up 12 weeks and 24 weeks after baseline. All assessments were done online via Qualtrics, with a private link emailed to participants at each timepoint. Additionally, clinical interviews to assess remission via phone call were done at baseline and at 10 weeks. Adverse events, including suicidality and serious deterioration (i.e. an increase in PHQ-9 scores of at least 5 points and a total score of at least 15 points that persists 2 weeks later), were also assessed. Clinical psychologists did suicide-risk assessments in all participants who reported two consecutive increased scores on the PHQ-9 suicide item “Thoughts that you would be better off dead or of hurting yourself in some ways”. In case of acute suicidality and serious deterioration, participants were provided with appropriate referral information to mental health professionals, but asked to continue with the intervention and the assessments.

Outcomes

The primary outcome was the self-reported level of depressive symptoms 10 weeks after baseline, as measured by the PHQ-9, which consists of nine items with scores ranging from 0 to 27 (Kroenke et

al., 2001). Secondary outcomes were PHQ-9 scores at 3 months and 6 months; remission of a depressive episode based on the SCID-5 at 10 weeks (First et al., 2015), and depressive symptoms measured by the Indonesian version of the Inventory of Depressive Symptomatology Self Report (Arjadi et al., 2017), fear and avoidance level as measured by the Fear Questionnaire (Marks & Mathews, 1979), perceived social support as measured by the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988), and quality of life as measured by the brief version of the WHO Quality of Life (WHOQOL Group, 1998) at 10 weeks, 3 months, and 6 months. A detailed description of the assessments is available in the trial protocol (Arjadi et al., 2016), mediation analyses of potential mechanisms will be reported elsewhere.

Statistical analysis

Statistical power was calculated to detect differences between two independent groups, in a two-sided test with an α of 0.05 and a power of 1-β=0.80, for an effect size of 0.35 (we chose a small-to-medium effect size because this study was done in a unique target population with insufficient information from similar previous studies). Allowing for 20% attrition, we aimed to recruit 312 participants at baseline. Analyses were done on an intention-to-treat basis. Range and mean of the total number of log-in encounters were calculated to represent participants' engagement in the online program. We did linear mixed modelling analysis with the restricted maximum likelihood estimation method for fixed (treatment and time) and random (participant) effects to examine the treatment effect by looking at the difference between the two groups in primary and secondary outcomes based on estimated marginal means from baseline. We analysed longitudinal within-participant data with missing values by linear mixed modelling because this method incorporates all available data to prevent complete-case bias (Gibbons, 1993). We reported relative risk (RR) and 95% CIs for the number of patients who recovered from depressive disorder in the GAF-ID compared with the control group. We also used linear mixed modelling analysis for sensitivity analyses of treatment completers (i.e. participants who finished at least five of the eight modules of the GAF-

ID program, a cut-off commonly used in previous studies (e.g. Bockting et al., 2018). Effect sizes (Cohen's d) were calculated by dividing the estimated mean difference (from baseline to 10 weeks, 3 months, and 6 months) reported from the linear mixed model results by the pooled SD at baseline.

We did additional post-hoc subgroup analyses for all potential moderators (i.e. number of previous depressive episodes, current post-traumatic stress disorder, negative life events, ethnic group, and connection to ethnic groups). Each moderator was investigated separately by including patient-by-treatment interaction terms and testing their significance with the Hayes Process tool (model 1) (Hayes, 2013). The results of these analyses should be interpreted with caution, however, because the study was not powered to test for moderation. The two-sided level of significance was set at 0.05, with 95% CIs for all analyses. All linear mixed modelling analyses were done with SPSS (version 23.0). This trial was registered in the Netherlands Trial Register, number NTR5920.

Results

Between Sept 6, 2016, and May 1, 2017, 1814 people took the screening PHQ-9 and 517 completed the clinical interview based on the SCID-5 (Figure 6.1). Of the 382 people who were eligible for inclusion, 313 were enrolled and randomly allocated, 159 to the GAF-ID group, and 154 to the PE group (Figure 6.1). Baseline characteristics of enrolled participants were similar in both intervention groups (Table 6.1). No participants were taking medications for mental health problems at enrolment or at their final interviews. At the final interview 10 weeks from baseline, the allocations of 179 (68%) of 265 participants (120 in the GAF-ID and 145 in the PE group) were correctly guessed by the research assistants.

Men and boys tended to decline participation in the study more often than females, but we noted no differences in terms of enrolment or declining to participate by age or depression level. Total 39 (25%) participants dropped out of the GAF-ID group and nine (6%) from the control group; thus 120 participants received the GAF-ID intervention and 145 participants received PE. The frequency of dropouts differed

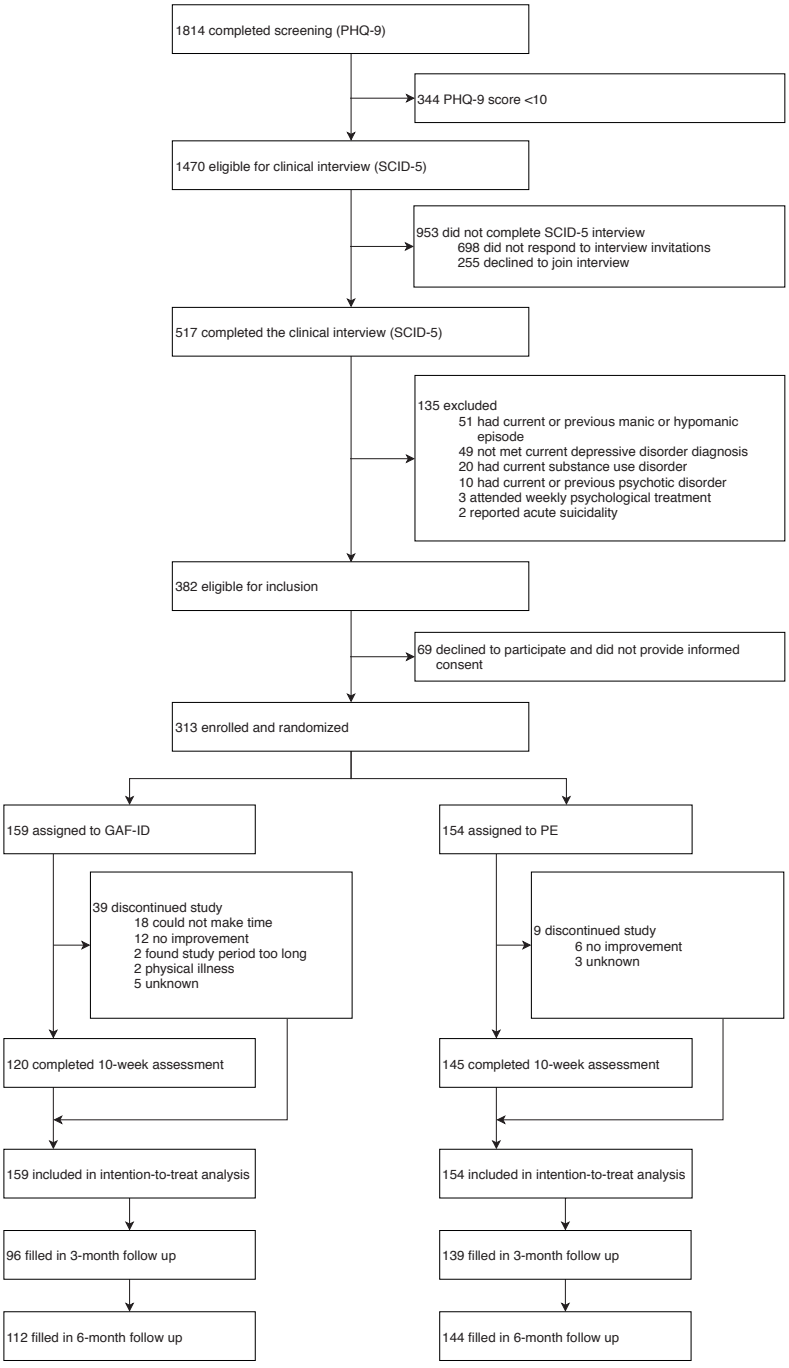

Figure 6.1. Trial profile

Table 6.1. Baseline characteristics of GAF-ID vs. PE

	GAF-ID (n=159)	PE (n=154)
Mean age (years, SD)	24.45 (4.93)	24.52 (5.22)
Sex (n,%)		
Male	31 (19)	29 (19)
Female	128 (80.5)	125 (81.2)
Ethnicity (n,%)		
Java	69 (43.4)	64 (41.6)
Tionghoa	30 (18.9)	18 (11.7)
Sunda	21 (13.2)	22 (14.3)
Batak	8 (5.0)	15 (9.7)
Minangkabau	8 (5.0)	6 (3.9)
19 other ethnicities	23 (14.5)	29 (18.8)
Living place (n,%)		
Java	138 (86.8)	140 (90.9)
Sumatra	10 (6.3)	6 (3.9)
Kalimantan	3 (1.9)	2 (1.3)
Sulawesi	3 (1.9)	2 (1.3)
Bali	3 (1.9)	1 (0.6)
Overseas	2 (1.2)	3 (1.9)
Area (n,%)		
Urban	93 (58.5)	96 (60.4)
Suburban	65 (40.9)	57 (37.0)
Rural	1 (0.6)	1 (0.6)
Marital status (n,%)		
Not married	141 (88.7)	135 (87.7)
Married	17 (10.7)	16 (10.4)
Divorce/widowed	1 (0.6)	3 (1.9)
Education level (n,%)		
Junior high	3 (1.9)	2 (1.3)
Senior high	61 (38.4)	59 (38.3)
Vocational	6 (3.8)	12 (7.8)
Bachelor	76 (47.8)	73 (47.4)
Master	13 (8.2)	8 (5.2)
Socioeconomic status (n,%)		
Low	32 (20.1)	27 (17.5)
Middle	98 (61.6)	100 (64.9)
High	29 (18.2)	27 (17.5)
Occupation (n,%)		
Unemployed	18 (11.3)	6 (3.9)
Professional	3 (1.9)	7 (4.5)
Private employee	56 (35.2)	48 (31.2)
Civil employee	6 (3.8)	3 (1.9)
Entrepreneur	4 (2.5)	4 (2.6)
Freelancer	13 (8.2)	17 (11.0)
Student	57 (35.8)	63 (40.9)
Housewife	2 (1.3)	6 (3.9)
PHQ-9 score	17.92 (5.38)	18.01 (5.05)
PHQ-9 category (n,%)		
Mild (10-14)	46 (28.9)	39 (25.3)
Moderate (15-19)	45 (28.3)	55 (35.7)
Severe (20-27)	68 (42.8)	60 (38.9)

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Male	31 (19)	29 (19)
Female	128 (80.5)	125 (81.2)
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19 other ethnicities	23 (14.5)	29 (18.8)
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Java	138 (86.8)	140 (90.9)
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Bali	3 (1.9)	1 (0.6)
Overseas	2 (1.2)	3 (1.9)
Area (n,%)		
Urban	93 (58.5)	96 (60.4)
Suburban	65 (40.9)	57 (37.0)
Rural	1 (0.6)	1 (0.6)
Comorbidity with PTSD (n,%) (SCID-5)		
Yes	22 (13.8)	30 (19.5)
No	137 (86.2)	124 (80.5)
Comorbidity with anxiety (FQ) (n,%)		
Yes	67 (42.1)	75 (48.7)
No	92 (57.9)	79 (51.3)

Socioeconomic status based on monthly household expenditure (Asosiasi Penyedia Jasa Internet Indonesia, 2017). PTSD (Post Traumatic Stress Disorder), SCID-5 (Structured Clinical Interview for DSM-5), FQ (Fear Questionnaire) cut-off score=30 (Mavissakalian, 1986).

significantly between groups (χ^2 21.03; p<0.0001). Participants who dropped out were significantly less depressed at baseline than those who remained in the study, but we noted no significant differences in terms of age or sex between those who remained in the study and those who left.

Participants in the GAF-ID group logged into the program a median of 13 times (IQR=14, Range=1-52, Mean=13.93, SD=10.92), completed a mean of five modules, and received a mean of 150 min telephonic support from lay counselors. In the PE group, participants logged in a median of two times (IQR=2; Range=1-10, Mean=2.36, SD=1.74).

At 10 weeks, self-reported depressive symptoms as measured by PHQ-9 were lower in the GAF-ID group than in the PE group (estimated mean difference -1.26 [95% CI=-2.29 to -0.23]; Cohen's d=0.24; *p*=0.017; Table 6.2). The mean PHQ-9 score at 10 weeks was 8.50 (SD=5.75) in the GAF-ID group and 10.83 (6.21) in the PE group. Scores on the Indonesian version of the Inventory of Depressive Symptomatology Self Report were also substantially lower in the GAF-ID group than in the control group at 10 weeks (estimated mean difference -2.48 [95% CI=-4.74 to -0.22; Cohen's d=0.24; *p*=0.031; Table 6.2).

Table 6.2. Treatment effect of GAF-ID vs. PE from linear mixed model at 10 weeks from baseline

Outcome measure	Total sample	
	Mean difference GAF-ID (n=159) vs. PE (n=154) (95% CI) or Relative Risk (95% CI)	*p*-value
Primary outcome		
PHQ-9	-1.26 (-2.29 to -0.23)	0.017
Secondary outcomes		
Depression remission (SCID-5)	GAF=78/120 (65.0%) PE=63/145 (43.4%) 1.50 (1.19 to 1.88)	<0.0001
IDS-SR	-2.48 (-4.74 to -0.22)	0.031
FQ	-1.32 (-4.60 to 1.95)	0.427
MSPSS	1.79 (-1.32 to 4.89)	0.258
WHOQOL-BREF	3.02 (0.81 to 5.23)	0.008

The mean differences are based on estimated marginal means. PHQ-9 (Patient Health Questionnaire 9), SCID-5 (Structured Clinical Interview for DSM-5), IDS-SR (Inventory of Depressive Symptomatology Self-Report), FQ (Fear Questionnaire), MSPSS (Multidimensional Scale of Perceived Social Support), WHOQOL-BREF (Brief version of World Health Organization Quality of Life).

The GAF-ID group had a 50% higher chance of remission from a depressive episode based on SCID-5 interview than the control group at 10 weeks (78 [65%] of 120 vs 63 [43.4%] of 145; RR=1.50 [95% CI=1.19 to 1.88]; p<0.0001). The number needed to treat was 4.6 in the GAD-ID group compared with the control group. Quality of life as measured by the brief version of the WHO Quality of Life at 10 weeks was also higher in the GAF-ID group than in the control group (estimated mean difference 3.02 [95% CI=0.81 to 5.23]; Cohen's d=0.30; p=0.008; Table 6.2). Results on the Fear Questionnaire and the Multidimensional Scale of Perceived Social Support did not differ significantly between groups at 10 weeks. Sensitivity analyses done in the 92 treatment completers who completed at least five GAF-ID modules had similar findings.

Treatment response was not moderated by any baseline patient characteristics. Total 47 (15%) participants reported increased suicide scores from baseline, but none reported serious deterioration on the self-report measures throughout follow-up. Based on our clinical psychologists' assessments, no one was acutely suicidal and therefore no participants were referred to mental health professionals.

Depressive symptoms as measured by PHQ-9 were reduced in the GAF-ID group compared with the PE group at 3 months (estimated mean difference -1.24 [95% CI=-2.29 to -0.19]; Cohen's d=0.24; p=0.021) and 6 months (-1.39 [95% CI=-2.40 to -0.39]; Cohen's d=0.27; p=0.007; Figure 6.2; Table 6.3). Sensitivity analyses for follow-up measures were done in 92 treatment completers; findings were largely similar to those of the main analyses.

Discussion

To our knowledge, ours is the first study of internet-based behavioural activation for depression in Indonesia. Our study showed that internet-based behavioural activation supported by lay counselors can reduce depressive symptoms and induce remission from a depressive episode more efficaciously than unsupported online psychoeducation in people with depression who live in LMICs. Our findings are in line with those of a previous study (Nobis et al., 2015) in a high-income country (Germany), in which an internet-based

Table 6.3. Treatment effect of GAF-ID vs. PE from linear mixed model over 3 months and 6 months follow-ups

Outcome measure	Total sample		Total sample	
	3 months follow-up		6 months follow-up	
	Mean difference GAF-ID (n=159) vs. PE (n=154) (95% CI)	*p*-value	Mean difference GAF-ID (n=159) vs. PE (n=154) (95% CI)	*p*-value
Primary outcome				
PHQ-9	-1.24 (-2.29 to -0.19)	0.021	-1.39 (-2.40 to -0.39)	0.007
Secondary outcomes				
IDS-SR	-2.55 (-4.93 to -0.17)	0.036	-3.18 (-5.51 to -0.86)	0.007
FQ	-1.48 (-4.72 to 1.75)	0.369	-1.08 (-4.23 to 2.07)	0.500
MSPSS	2.02 (-1.03 to 5.07)	0.194	1.84 (-1.20 to 4.89)	0.235
WHOQOL-BREF	2.48 (0.20 to 4.76)	0.033	2.35 (0.09 to 4.62)	0.042

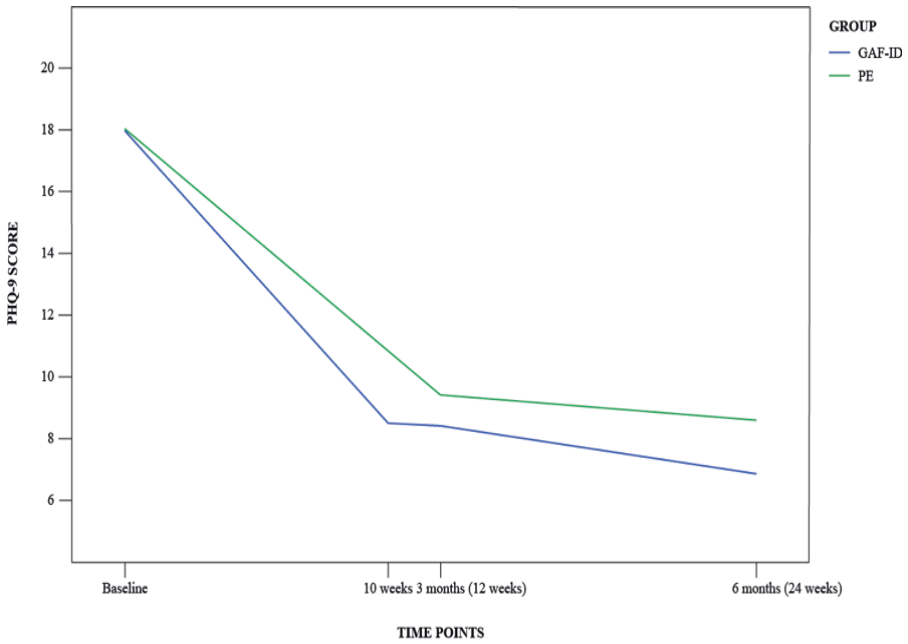

Figure 6.2. Change from baseline to end of follow-up in PHQ-9 scores with GAF-ID vs. PE

psychological intervention was superior to psychoeducation alone in reducing depression. In a previous small study in another LMIC (Romania), an internet-based intervention produced greater reduction in depression symptoms than did treatment as usual (Mogoaşe et al., 2013).

The effect size of 0.24 at 10 weeks for GAF-ID versus PE in this study is lower than reported effect sizes in meta-analyses of face-to-face behavioural activation interventions (Mazzucchelli et al., 2009) and more general internet-based interventions for depression (Josephine et al., 2017). However, it is similar to the reported effect size in a meta-analysis (Cuijpers et al., 2018) of face-to-face interventions after adjustment for biases, and the effect size was sustained for at least 6 months. Furthermore, comparisons to waitlist usually yield larger effects than comparisons to other interventions, ranging from 0.74 to 1.81 for face-to-face behavioural activation (Mazzucchelli et al., 2009) and from 0.61 to 1.13 for internet-based interventions (Josephine et al., 2017). In our study, we compared GAF-ID with PE, with identical assessment in both groups. The number needed to treat suggests that, relative to PE, GAF-ID generated one additional remission for every five people treated.

Our findings suggest the potential of online behavioural activation interventions combined with task shifting by lay counselor support as recommended by WHO (Beaglehole et al., 2008) to bridge the mental health gap in LMICs (Arjadi et al., 2015). However, we cannot rule out the possibility that the additional effect of GAF-ID could be explained by the support added to GAF-ID. Future studies should examine whether the effects recorded could be attributed to the additional support given to the GAF-ID group rather than the content of the GAF-ID intervention.

Our study has several limitations. Participants anecdotally reported that some features of the GAF-ID program were not fully accessible from mobile phones (e.g. embedded slide shows were not appropriately displayed), so they had to use computers or tablets interchangeably with their mobile phone to finish the program. Because 72% of web traffic in Indonesia is via mobile phone (We Are Social, 2018b), we recommend that future studies assess programs

that are fully accessible on mobile phones or that are built as apps. With regard to blinding procedures, research assistants were no longer blinded to allocation after the final interviews at 10 weeks. Unblinding could have influenced the ratings on the clinical interviews. However, because the results were in line with self-report data at 10 weeks, we think that such bias is unlikely.

We did not aim to recruit participants with specific demographic characteristics. Most participants lived on Java, yet came from and represented various cultural backgrounds in Indonesia (Table 6.1). However, our sample consisted largely of relatively young, highly educated individuals who were likely to be internet literate and could have been more aware of mental health than older or less well educated people. 99% of participants lived in urban or suburban areas of Indonesia, compared with 54% of the Indonesian population overall (World Bank, 2016b). Internet penetration in Indonesia is 72.41% in urban areas, 49.49% in suburban areas, and 48.25% in rural areas (Asosiasi Penyedia Jasa Internet Indonesia, 2017). Therefore, our findings might not be generalisable to non-urban populations or to people who do not yet have internet access. To counter such limitations, and in line with WHO's recommendation to increase access and dissemination through the mental health Gap Action Program (World Health Organization, 2008a), more effort should be made in future studies to make internet-based interventions accessible for a broader swathe of the population, including people of low socioeconomic status who live in rural areas and have restricted internet access. The potential of internet-based interventions for remote populations can be maximised by reaching local community health centres, which was done for a face-to-face intervention in LMICs (Patel et al., 2017), whereby information about depression and available internet-based intervention could be delivered, and a computer with internet access along with technician support could be provided. Such an intervention could also be combined with structured phone call support from lay counselors, as was done in our study. In a global context, replication of our study in other LMICs, preferably including cost-effectiveness analyses, is recommended as a next step to reduce the global mental health gap.

In our study, depressive symptoms decreased in both groups, but decreased significantly more in the GAF-ID group than in the control group. Because we did not include an inactive control group (i.e. waitlist or treatment as usual), we cannot be sure whether symptom reduction in the control group was because of the passage of time or regression to the mean, the effect of screening and assessments throughout the study, or the psychoeducation content. This uncertainty has implications for future studies and potentially for implementation. Replication of our study with an additional control arm (waitlist or treatment as usual) is recommended. Studies could also be done in which unsupported psychoeducation is compared with waitlist or treatment as usual to establish whether online psychoeducation alone can produce substantial improvements in mental health in LMICs. Both GAF-ID and PE could be delivered online to bridge the mental health gap in LMICs. Alternatively, a stepped-based approach of psychoeducation followed by GAF-ID (in case of non-response to online psychoeducation) could be considered.

The drop-out rate was higher in the intervention group than in the control group, a pattern that is frequently reported in studies of internet-based interventions (Josephine et al., 2017). The increased frequency of dropout in the intervention group in our study was probably because of the greater demands put on participants in the GAF-ID group compared with those in the PE group. Some participants in the GAF-ID group anecdotally reported a burden with regard to the demand to login into the program and do the assignment every week, whereas no such requirement applied to the PE group. Although rates of participant engagement in this study might seem low, they were actually relatively high for a study of internet-based interventions, with reported drop-out rates of up to 43% for the active intervention and an average of 8% for active control interventions in other studies (Josephine et al., 2017). Some possible explanations for the relatively low frequency of dropouts in our study are related to access, cost, and the intervention's ability to hold engagement (Bennet-Levy et al., 2010). We introduced internet-based intervention as a source for mental health services with no face-to-face contact and at zero cost (although no one accepted our offer to reimburse the costs of internet

access). We also made the program as attractive as possible and provided human supports (lay counselors), who were available to help throughout. Future studies and implementation should look for ways to increase participant engagement.

In conclusion, our internet-based intervention with support from lay counselors has large potential for widespread dissemination, and could help to bridge the mental health gap in LMICs. Our study is a crucial first step towards empirical evidence for delivery via the internet of easy accessible minimal interventions, which have the potential to reach a broad population with little or no access to mental health care (Bockting et al., 2016).

Research in context

Evidence before this study

The main evidence base for this trial was a systematic review published in 2017 about all types of digital technology for treatment and prevention of mental disorders in low-income and middle-income countries. Of the 49 studies included in that narrative review, two were randomized controlled trials in which the internet was used for non-pharmacological treatment of depression (both were done in Romania). In one, online concreteness cognitive training was compared with waitlist (n=42; Cohen's d=-0.16); in the other, online cognitive behavioural therapy was compared with treatment as usual (n=27; Cohen's d=0.49). To update this evidence base, we searched PubMed and PsycINFO with the medical subject heading terms “internet”, “online therapy”, “intervention”, “psychotherapy”, “randomized controlled trial”, and “clinical trial”, combined with free text “developing countr*”, “LMIC”, “LAMIC”, “LAMI countr*”, “LMI countr*”, “low income countr*”, “middle income countr*”, “low-middle income countr*”, “lower-middle income countr*”, “upper-middle income countr*”, and each country on the World Bank's list of low-income and middle-income countries, for articles published in any language between Sept 1, 2016, and Feb 28, 2018. We also did free-text searches with the terms “internet” or “online” or “web-based” or “electronic mail*” or “e-therapy” or “web” or “self-help” or “website or computer*” or “e-health” or “e-mental

health" in combination with "LAMIC" or "LMIC" or "LAMI countr*" or "LMI countr*" or "low income countr*" or "middle income countr*" or "low-middle income countr*" or "lower-middle income countr*", and "upper-middle income countr*", and searched the reference lists of papers identified by our searches. We identified no further relevant articles with this search.

Added value of this study

To our knowledge, ours is the first well powered randomized clinical trial in which the efficacy of a psychological intervention for depression was assessed in a low-income or middle-income country, with participants recruited from the community. Internet-based behavioural activation with lay counselor support was significantly more efficacious than online psychoeducation without support at reducing symptoms of depression as measured by the Patient Health Questionnaire 9.

Implications of all the available evidence

Internet-based behavioural activation intervention with non-specialist support could be used to bridge the mental health gap in low-income and middle-income countries, and have the potential to reach populations with little or no access to mental health care.

CHAPTER 7

General Discussion

This thesis sets out to investigate whether the use of the internet in assessing depression and the use of the internet for delivering psychological intervention for depression combined with task sharing might be feasible and effective steps toward bridging the mental health gap in LMICs. In this section, the results of the studies in this thesis will be summarized, followed by relevant and important discussions on all of the studies.

LMICs are facing an increase of the impact of mental health problems while confronted with limited resources and limited access to mental health care, known as the 'mental health gap' (World Health Organization, 2008a). The mental health gap is related to mental health care in general, including mental health intervention and assessment.

Limited access to mental health interventions is one of the main issues in the mental health gap in LMICs. One strategy to reduce the gap would be to utilize the internet to provide more widely-distributed and potentially lower cost mental health care. In high income countries, there is a large body of literature showing the effectiveness of internet-based interventions for various mental health conditions (Burton et al., 2016). In chapter 2, we undertook a systematic review to investigate the effectiveness and efficacy of internet-based interventions in LMICs, including all randomized controlled trials (RCTs) of internet-based interventions in LMICs. We found only three articles that reported results of RCTs on internet-based interventions for mental health conditions in LMICs, and none of these interventions was compared with an active control condition. Also, the mental health conditions were diverse across the three studies. A more updated systematic review has added one more RCT on depression to the list indicated a positive effect of cognitive-behavior therapy (Naslund et al., 2017). There is a dearth of studies examining the effect of internet-based interventions in LMICs, so we cannot draw any conclusions on the effectiveness. However, given the empirical evidence of the effectiveness of internet-based interventions in high income countries and the sharp increase of internet access in LMICs, internet-based interventions may offer a potential to help reduce the 'mental health gap'. More studies are urgently needed in LMICs.

Following the results of the systematic review, we worked on a plan to conduct an internet-based intervention study in Indonesia, as one of the LMICs listed for intensified support by the WHO since 2008 (World Health Organization, 2008a). For Indonesia, the use of internet-based interventions may represent a promising strategy to reduce the mental health gap, given that the level of internet usage in the country continues to increase. To check the acceptability of internet-based interventions, chapter 3 investigates factors that contribute to the use of internet-based interventions for depression in Indonesia. The survey was conducted online and had 904 participants recruited from specific social networks on mental health and general social media (Mean age=27.1, 50% females). The three dependent variables were (1) behavioral intention to start using internet-based interventions for depression, (2) preference to use it as a substitute for regular treatments and (3) preference to use it to complement regular treatments. The predictor variables included sociodemographic characteristics, perceived mental health conditions, personal situational characteristics, personal innovativeness toward online services, and depression level. A large majority reported to be open to using internet-based interventions for depression (73.7%), as well as to use it as a substitution (73.3%) or as a complementary (73%) to regular treatments. Personal innovativeness toward online services was the strongest significant predictor for all types of use, even when corrected for current depression level. When added to the analyses separately, depression level was the second strongest predictive factor for all dependent variables. In conclusion, the majority of Indonesians showed openness to use internet-based interventions for depression. To increase the adoption of internet-based interventions for depression, it is important to first promote internet usage to more people across the country, especially for those who are currently depressed.

With regard to assessment, depression screening and examination in LMICs, including Indonesia, are highly challenging due to the disproportionately low number of mental health professionals in comparison to the Indonesian population. Self-report questionnaires on depression are less time consuming than clinical interviews, while providing a good opportunity for screening for mental health

problems such as depression. Chapter 4 investigates the psychometric properties of the Indonesian Inventory of Depressive Symptomatology Self Report (IDS-SR). The participants were 904 Indonesians (aged 16-61; 50.2% female), recruited via an online survey using Qualtrics, an online platform for surveys. Confirmatory factor analyses of the one-factor, three-factor, and four-factor model were explored. Convergent and divergent validity of the total score of the Indonesian IDS-SR and each factor were examined, as well as Cronbach's Alpha reliability. In addition, an optimal cut-off score for the Indonesian IDS-SR was established using ROC curve analysis. The three-factor model of "cognitive/mood", "anxiety/arousal", and "sleep disturbance" was the best fit with the Indonesian IDS-SR data. Convergent and divergent validity were good. Cronbach's Alpha reliability was excellent for the total score, good for the factors "cognitive/mood" and "anxiety/arousal", but insufficient for the factor "sleep disturbance". The optimal cut-off score of the Indonesian IDS-SR was 14, in accordance with the internationally used cut-off score, with 87% sensitivity and 86% specificity. As a multifactorial instrument to measure depression that has good validity and reliability, the Indonesian IDS-SR can be used to assess depressive symptoms for screening and diagnosis for the purpose of research and clinical practice.

Following the results of the internet-based acceptability survey, a study protocol for a randomized controlled trial was developed, as presented in chapter 5. The aim of the trial was to investigate whether such an internet-based treatment for depression is effective in Indonesia. As reported in chapter 6, between September 6, 2016, and May 1, 2017, 313 participants were enrolled and randomly assigned, 159 to the GAF-ID group and 154 to the PE group. At 10 weeks, PHQ-9 scores were significantly lower in the GAF-ID group than in the PE group (mean difference -1.26 points [95% CI=-2.29 to -0.23]; p=0.017), and participants in the GAF-ID group had a 50% higher chance of remission at 10 weeks (relative risk 1.50 [95% CI=1.19 to 1.88]; p<0.0001. An effect size of 0.24 for the GAF-ID group compared with the control group at 10 weeks was sustained over time (effect size 0.24 at 3 months, and 0.27 at 6 months). For secondary outcomes, there were no significant change in fear and perceived social support,

but quality of life reported to increased. To our knowledge, ours is the first adequately powered randomized clinical trial of an internet-based intervention for depression in a low-income or middle-income country. Internet-based behavioral activation with lay support efficaciously reduced symptoms of depression, and could help to bridge the mental health gap in low-income and middle-income countries.

In this final chapter, several topics will be discussed, including acceptability of internet-based interventions, conducting and assessing the effectiveness of internet-based interventions in LMICs, the use of task sharing to reduce the mental health gap, and final conclusions.

Acceptability of internet-based interventions

Internet is known as a potential medium to deliver low-cost interventions widely (Napolitano et al., 2003). Internet-based intervention is a novel approach in Indonesia. Thus, prior to the implementation of internet-based interventions, it is important to first check the readiness of the Indonesians as targeted population. Our study (chapter 4) reported a good acceptability level of participants to use internet-based interventions for depression, not only to start using it, but also to use it as a substitute and complement to regular intervention.

In our study, we found personal innovativeness toward online services and depression level as the most important predictors of use. Other studies highlighted the importance of demographic variables, of which on sex emerged as a significant predictor in our study, with female participants reported higher level of the intention. This is in line with findings from previous studies indicating that, in general, women tend to have higher help seeking patterns than men with regard to mental health complaints (Möller-Leimkühler, 2002; Oliver et al., 2005). Other demographics can also be of interest, for instance age and socioeconomic status which reported as significant predictors of usage intention of mobile health services (Rai et al., 2013). With regard to other demographic characteristics aside from sex, there may be bias in our sample because the sample characteristics in the study was not diverse by demographic standards, where most participants

were young adults who had a relatively high education level and came from middle socioeconomic status. That might be a reason that no demographic characteristics aside from sex emerged as significant predictors. More diverse samples in terms demographic characteristics are needed for future studies.

Aside from assessing factors that might predict acceptability of internet-based interventions in Indonesia, to enhance the chance of the acceptability, we also did a systematic cultural adaptation on the content of the interventions. This is especially relevant to do in the current study because the intervention we used in our study (chapter 5 and 6) were adapted from the original version developed within the Dutch culture. The adaptation process took approximately 1 year and 4 months, starting in April 2015. The adaptation was done for two different but related components: the behavioral activation content and the internet-based intervention program presentation. We used the formative method for adapting psychotherapy (FMAP) approach (Hwang, 2009) to adapt both components. It consists of 5 phases: (a)generating knowledge and collaborating with stakeholders, (b)integrating generated information with theory and empirical and clinical knowledge, (c)reviewing the initial culturally adapted clinical intervention with stakeholders and revising the culturally adapted intervention, (d)testing the culturally adapted intervention, and (e) finalizing the culturally adapted intervention (Hwang, 2009).

In phase 1, we involved the following stakeholders: licensed clinical psychologists as mental health agencies and mental health care providers, mental health related communities and our lay counselors as community-based organization and agencies, and patients as user. We received many valuable feedbacks given by the stakeholders regarding the behavioral activation content, i.e. the expressions of pleasurable activities and relevant case examples in the Indonesian context. They also provided feedback on the presentation of the internet-based intervention program, i.e. the recommendation to use less text and more illustrations and they provided suggestions on the illustration themes. In phase 2, information generated from the stakeholders was synthesized with existing literature. All adaptations were discussed

Table 7.1. Cultural Elements for Adaptation of Internet-Based Behavioral Activation in Indonesia

Cultural Elements	Indonesian Cultural Elements	Resulting Adaptations
Language	Bahasa Indonesia as a national language	The intervention is provided using a formal Indonesian language
Persons	Participants are Indonesian depressed individuals	The delivery of the intervention is supported by Indonesian lay counselors (non face-to-face) according to random selection
Metaphors	Indonesian common local setting and point of view	Examples utilized local images, local activities that are relevant to Indonesian population in general
Content	Indonesian cultural traditions and beliefs, i.e. the patriarchy system	Therapist image on the internet-based intervention program presented as a professional male figure Case examples presented in both male and female figures to show that depression can happen to anyone irrelevant of the sex
Concepts	First systematic online behavioral activation intervention in Indonesia: local conceptual model is still unknown	Consultations with local stakeholders confirmed conceptual compatibility
Goals	There is taboo / stigma on being depressed, and it is important that individuals are mentally healthy and integrated in the community	Provide psycho-education on depression. The goal of the intervention is to be more active and less depressed, so that individuals can be well integrated in the community Relative to the Dutch version, more case examples of activities in social networks were provided such as going to the market with a friend (rather than individual activities such as reading a book alone at home, that would be more common and more appreciated in the Netherlands)
Methods	Implementation is adapted to features of Indonesian cultural setting	Online guidance by lay counselors is provided at flexible time according to the needs of participants via chats and emails “Touch” of direct contact with lay counselors is given by scheduled telephonic contacts, simultaneously aiming to prevent attrition
Context	Negative stigma on depression in the society in general Most participants have no or limited access to mental health interventions in general and this is the first internet-based psychological intervention for depression in Indonesia	Provide psychoeducation on depression A very clear repetitive step-by-step instruction is provided on the internet-based intervention program, equipped with interesting illustrations to make it more interactive

within the research group and consulted to one independent clinical psychologist to maintain objectiveness. In phase 3, the culturally adapted manual was written and given to the stakeholders to gather feedback for further improvement. More minor revisions based on their feedback were made, for instance related to the word choices and clarity and concision of the instructions. For the elements of cultural adaptation, we took into account the eight culturally sensitive elements necessary for cultural adaptation of a psychosocial treatment, i.e. language, persons, metaphors, content, concepts, goals, methods, and context (Bernal, Bonilla, & Bellido, 1995). See table 7.1.

In phase 4, we conducted pilot testing to 10 depressed individuals (patients of our clinical psychologist stakeholders in Indonesia), 16 non-depressed individuals with various education backgrounds, age groups, and sexes, and 5 clinical psychologists. Feedback on some ambiguous texts and unclear instructions were received and integrated in a new version. In phase 5, the internet-based intervention program was finalized and the website was ready. Information on the research team members was included, including pictures and a short personal description of the researchers and research assistants, in order to enhance credibility of the website.

Earlier studies on the development and implementation of face-to-face psychological interventions in LMICs also showed the importance of having a culturally adapted version of the intervention. For instance, in India (Chowdhary et al., 2016), a behavioral activation treatment with added emphasis on problem solving and activation of social networks was developed. The treatment was culturally sensitive for the local population according to a systematic method which arose from their systematic review (Chowdhary et al., 2014). A research group in Kenya (Papas et al., 2010) adapted a cognitive behavioral therapy to be more culturally sensitive to Kenyan culture according to the Bernal and colleagues' eight cultural elements (Bernal et al., 1995). Another research group in Nepal adapted a dialectical behavior therapy using a tri-phasic approach of qualitative interviews, an adaptation workshop, and a small-scale treatment pilot testing with patients (Ramaiya, Fiorillo, Regmi, Robins, & Kohrt, 2017).

Given the importance of measuring acceptability and doing systematic cultural adaptation when necessary, we recommend other LMICs to also systematically carry out cultural adaptations of the intervention content in close collaboration with stakeholders and measure acceptability before implementing the internet-based interventions. A recent systematic review found that the hypothetical acceptability of internet-based interventions for mental health problems (before access) is relatively low, but the actual acceptability (after access) is reported to be high, especially when remote online support was provided (Berry et al., 2016). So, individuals who are actually in need of such an intervention are more likely to find internet-based interventions acceptable. It is therefore recommended to measure both hypothetical acceptability and actual acceptability to examine whether initial perceptions of internet-based interventions change after access. The actual acceptability may be even higher given that hypothetical acceptability is generally lower than actual acceptability by end users who actually need the intervention and actually use the intervention.

Assessments

Assessment is one of the important keys in the delivery of mental health service. Adequate mental health assessment will provide accurate descriptions and, if relevant, provide a basis for assigning clinical diagnosis of individuals' mental health conditions, which then also results in choosing the appropriate intervention.

In mental health research and clinical practice, a clinical interview is a golden standard diagnostic and tool, and often used as the main source of information in clinical assessment (World Health Organization, 2008a). However, interviewing techniques are difficult to master and implement (Tomas-Aragones et al., 2017), and therefore, the utilization of clinical interview in LMICs can be very challenging due to the limited resources of trained professionals and limited budget for mental health assessment and services in general.

In our study (chapter 6), the clinical interview (SCID-5 (First et al., 2015)) was administered by Psychology Bachelor's degree graduate

who underwent a structured training on how to conduct the SCID-5 interview. This option is seemingly feasible, but still required quite some costs for personnel and for training that might not suitable for every condition in LMICs. When clinical interviews are not feasible to be done, self-report can be served as a more feasible option to inform clinical decision making as well as in the context of research. Self-report questionnaires have been reported to have a moderate level of agreement with clinical interviews (Stuart et al., 2014). This means, despite the risk in relying solely on the judgements and insights of the respondents, self-report questionnaire can be used to identify a mental health condition with some degree of confidence. In addition, self-report questionnaires are easy to use by people from any discipline without the requirement of a professional background. Moreover, some studies, both in HICs and LMICs are reported to successfully use self-report questionnaires for measuring depression in their studies. Examples of studies using self-report as a primary measure in internet-based intervention research include a study on effectiveness of web-based CBT for depression using CES-D (Center for Epidemiological Studies Depression Scale) in a HIC (Buntrock et al., 2015) and a study on effectiveness of internet-delivered concreteness training for depression using BDI-II (Beck Depression Inventory II) in a LMIC (Mogoaşe et al., 2013).

With regard to this issue, for studies on depression, our study (chapter 2) indicated that the Indonesian version of IDS-SR is a valid and reliable measure to assess depressive symptoms for the purpose of research and clinical practice. In LMICs which usually have low-resources and where depression screening is highly needed, relying on self-report can be a second-best option to replace a clinical interview, both in the context of research and clinical practice. Alternatively, when conducting specific assessment is difficult or not feasible, it is also possible to use a transdiagnostic approach for both assessment and treatment that can be applied across common mental health problems (Bockting et al., 2016).

Conducting trials assessing the effectiveness of internet-based interventions in LMICs

Prior to implementation, the WHO strongly recommends to test the effectiveness of any new form of psychological intervention in a new population. Our study (chapter 6) demonstrated that conducting such trial investigating effectiveness is feasible in a LMIC, even though such studies are scarce.

Our systematic review in 2015 found three RCTs on internet-based interventions for mental health problems in LMICs, and only one of them was on depression. An updated systematic review (Naslund et al., 2017) also in LMICs, added eight RCTs on internet-based interventions for mental health problems to the list. In total, eleven RCTs were reported, with effect sizes (Cohen's d) ranging from -0.16 to 1.72, with high variation in study quality and mental health problems targeted (two on depression; N=27-42, one on suicide; N=68, three on trauma; N=82-197, one on internet addiction; N=65, one on obsessive-compulsive, N=72, one on substance misuse; N=333, and two on social anxiety; N=66-76). Both of the depression RCTs were done in Romania with effect size (Cohen's d) ranging from -0.16 to 0.49 (Naslund et al., 2017). The systematic reviews showed not only that it is feasible to conduct a randomized controlled clinical trial to examine the effectiveness of internet-based interventions in LMICs, but also that internet-based interventions offer potential benefit given its effectiveness to reduce mental health complaints.

Internet-based intervention is a type of psychological intervention used in non-specialized health-care settings, a strategy of providing mental health service for more people in need with the goal to reduce the mental health gap (World Health Organization, 2016). These have encouraged the study we conducted in Indonesia. In our trial, we did not include a non-active control condition, but rather a condition with online delivered psychoeducation. Even though depressive symptoms decreased over time also in the psycho-education condition, we cannot conclude based on this study that psychoeducation is effective. Just the passage of time or regression to the mean could have been responsible for this decrease. Alternatively, just participating in a trial

and receiving information about the rationale of the study and taking part in assessments could have influenced the levels of depression. Such expectancy effects have indeed been reported in in the context of online treatments for individuals with depression (Cludius, Schröder, & Moritz, 2018). Therefore, we consider it is important to do a validation in a three-arm study, comparing internet-based BA with lay counselor support versus online-delivered psychoeducation without support versus treatment as usual or waitlist. This will enable to potentially replicate the effect of internet-based BA, and to go beyond replication, and additionally examine the effectiveness of online psychoeducation.

Our study has shown that internet-based interventions for depression can be implemented to a large number of participants within different regions in a considerably large country, with the support of non-specialists who were trained to give therapist support. Implementing studies on internet-based interventions for depression may also be applied in other LMICs. For instance, China, as one of the largest and most populous LMICs is reported to have 4.2% point prevalence of depression (World Health Organization, 2017) with rates of 9.7:100,000 population (World Health Organization, 2018b) has implemented internet-based interventions studies previously (e.g. Su et al., 2011; Wang et al., 2013). Therefore, conducting studies on guided internet-based interventions for depression in a LMIC like China can be considered as important given the potential and the opportunity. Another large and populous country, India, reported to have 4.5% point-prevalence of depression (World Health Organization, 2017) and suicide rates of 16.3:100,000 in the population (World Health Organization, 2018b) might also benefit from using internet-based intervention for depression, since the use of internet in India is also increasing (World Bank, 2016a).

Another potential field for the development, systematic evaluation, and implementation of internet-based interventions, beyond LMICs, is in the context of refugees. Depression is reported as one of the most common mental health problems among refugees apart from anxiety and PTSD (Lindert, Von, Wehrwein, Brähler, & Schäfer, 2018). According to recent study, Syrian refugees in Europe (e.g. Switzerland, Germany,

Netherlands) are at risk to develop mental health problems but have limited access to mental health care (Sijbrandij et al., 2017). Guided self-help interventions have been used to counter such problem in refugees and have been reported to be effective to reduce depression, for instance the use of Self-Help Plus (SH+) of the WHO delivered by lay people for Sudanese refugee in Uganda (Tol et al., 2018).

Our study in Indonesia has some limitations. One of them is the sample representativeness. Most of our participants were relatively young and highly educated people who came from middle socioeconomic status, were internet literate and might be more aware of mental health compared to those who come from lower socioeconomic status or who are less educated. Given the highest prevalence of moderate and severe depressive symptoms in Indonesia was reported among the age group of 20-29 years (Peltzer & Pengpid, 2018), and given that suicide is reported as the second leading cause of death among young population of 15-29 years old globally (World Health Organization, 2018a), we do think that our intervention reached a very relevant group. However, efforts also need to be done to reach the older depressed population as well as people with a lower socioeconomic status. A previous study in Indonesia reported that depression is more concentrated among the poor (Christiani, Byles, Tavener, & Dugdale, 2015). Therefore, it is important to increase access by reaching poorer population in remote areas. Future studies in Indonesia may put more effort into making internet-based interventions accessible for low socioeconomic population and with more limited internet access who live in rural area. This is possible, given the increased online infrastructure in rural area of Indonesia with reported 48.25% internet penetration (Asosiasi Penyedia Jasa Internet Indonesia, 2017).

In addition to putting effort in reaching subgroups for internet-based interventions via the internet, one may consider using other pathways to reaching these subgroups, not only in Indonesia, but also in a broader context. The potential of internet-based interventions for remote populations can be maximized by reaching local community health centers as has been done for a face-to-face context in a LMIC,

India (Patel et al., 2017), where information regarding depression and the internet-based intervention can be first introduced. Proper introduction or campaign regarding internet use in general and internet-based interventions for mental health specifically may be helpful, since our survey regarding the acceptability of internet-based intervention for depression in Indonesia showed that personal innovativeness toward online services is the most significant predictor of intention to use the internet-based intervention. When the population is ready, it can be followed by providing computer with internet access and technician support, for instance via these local community health centers. Structured phone call support from lay counselors can also be part of such implementation, as was done in the current study.

Task sharing: collaborating with mental health specialists and (lay) counselors

As mentioned earlier, a recent systematic review found that the hypothetical acceptability of internet-based interventions for severe mental health problems is assumed to be relatively low, while the actual acceptability is reported to be high, especially when remote online support is provided (Berry et al., 2016). Out of eleven studies from the systematic review previously mentioned, two studies included therapist support, i.e. a study on PTSD in Iraq with N=159; Cohen's d=0.92 (Knaevelsrud, Brand, Lange, Ruwaard, & Wagner, 2015) and a study on social anxiety in Romania with N=76; Cohen's d=1.19 (Tulbure et al., 2015). Both studies reported effect sizes close to 1, while non-therapist supported studies reported larger range of effect sizes from the range of -0.16 to 1.72 as mentioned above. The availability of therapist support in internet-based interventions is reported to increase the effect size (Andersson & Cuijpers, 2009; Spek et al., 2007). In our study, we specifically utilized support from trained lay counselors (non-specialists), representing task sharing as recommended by the World Health Organization (Hoeft et al., 2018; World Health Organization, 2008b) in delivering internet-based intervention which has high potential to be implemented in LMICs.

To date, there is multiple evidence of how internet-based interventions for mental health may work well in LMICs. In the context of global health, the WHO concerns on how to implement proven interventions in the real world given a little understanding of how best to deliver those interventions across the diverse settings, especially in LMICs (Peters, Tran, & Adam, 2013). We recommend the use of task sharing in LMICs, in order to reach more people in need. Furthermore, in refugees, language and cultural differences have been reported as specific barriers in handling their mental health (Kirmayer et al., 2011). Since internet-based interventions could be delivered from far, if local therapist support is not available within the country or if local therapist support is not preferred due to the language and cultural differences, it can also be provided from other regions. If desired, support could even be coming from the original countries, although some clinical imbedding in the region will still be needed. Also, some refugees may be reluctant to accept help that is embedded within the country that they fled from. Judicious action should be taken during implementation since there may be legal issues and issues of privacy that need to be considered when crossing borders.

Final conclusions

The development and use of technology in supporting health care system is now emerging. When used effectively, technology can enable the automation and integration of clinical and administrative functions in healthcare, reduce the workload of healthcare professionals, and eventually improve healthcare qualities (Yang, Kankanhalli, & Chandran, 2015). Thereby, the use of technology can improve accessibility to mental health services, from delivering assessment to delivering effective treatments for common mental health problems.

This thesis provides the first evidence that the internet-based interventions with lay counselor (non-specialist) support may be an effective approach that can help to reduce the mental health gap in LMICs. Moreover, it provides a basis for the development of such interventions for special population in HICs, i.e. refugees, and the individuals with poor access to mental health care.

REFERENCES

References

Akaike, H. (1974). *A new look at the statistical model identification. IEEE Transactions on Automatic Control, AC-19*(6), 716–723.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Andersson, G., Bergström, J., Holländare, F., Carlbring, P., Kaldo, V., & Ekselius, L. (2005). Internet-based self-help for depression: randomised controlled trial. *The British Journal of Psychiatry, 187*(5), 456–461. https://doi.org/10.1192/bjp.187.5.456

Andersson, G., & Cuijpers, P. (2009). Internet-based and other computerized psychological treatments for adult depression: a meta-analysis. *Cognitive Behaviour Therapy, 38*(4), 196–205. https://doi.org/10.1080/16506070903318960

Andersson, G., Cuijpers, P., Carlbring, P., Riper, H., & Hedman, E. (2014). Guided internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: a systematic review and meta-analysis. *World Psychiatry, 13*(3), 288–295.

Andersson, G., & Titov, N. (2014). Advantages and limitations of Internet-based interventions for common mental disorders. *World Psychiatry, 13*(1), 4–11.

Andrews, G., Cuijpers, P., Craske, M. G., McEvoy, P., & Titov, N. (2010). Computer therapy for the anxiety and depressive disorders is effective, acceptable and practical health care: a meta-analysis. *PloS One, 5*(10), e13196. https://doi.org/10.1371/journal.pone.0013196

Anestis, M. D., Peterson, C. B., Bardone-Cone, A., Klein, M. H., Mitchell, J. E., Crosby, R. D., … Joiner, T. E. (2009). Affective lability and impulsivity in a clinical sample of women with bulimia nervosa: the role of affect in severely dysregulated behavior. International Journal of Eating Disorders, 42(3), 259–266.

Arjadi, R., Nauta, M. H., Chowdhary, N., & Bockting, C. L. H. (2015). A systematic review of online interventions for mental health in low and middle income countries: a neglected field. *Global Mental Health, 2,* e12. https://doi.org/10.1017/gmh.2015.10

Arjadi, R., Nauta, M. H., Utoyo, D. U., & Bockting, C. L. H. (2017). The Inventory of Depressive Symptomatology Self Report (IDS-SR): psychometric properties of the Indonesian version. *PLOS ONE, 12(10)*(e0187009). https://doi.org/10.1371/journal.pone.0187009

Arjadi, R., Nauta, M. H., Scholte, W. F., Hollon, S. D., Chowdhary, N., Suryani, A. O., & Bockting, C. L. H. (2016). Guided Act and Feel Indonesia (GAF-ID) – Internet-based behavioral activation intervention for depression in Indonesia: study protocol for a randomized controlled trial. *TRIALS, 17*(455). https://doi.org/10.1186/s13063-016-1577-9

Arning, K., & Ziefle, M. (2009). Different perspectives on technology acceptance: the role of technology type and age. In *HCI and Usability for e-Inclusion* (pp. 20–41). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-10308-7_2

Asosiasi Penyedia Jasa Internet Indonesia. (2015). *Profil Pengguna Internet Indonesia 2014.* Asosiasi Penyedia Jasa Internet Indonesia.

Asosiasi Penyedia Jasa Internet Indonesia. (2017). *Infografis Penetrasi & Perilaku Pengguna Internet Indonesia 2017.* Retrieved from https://www.apjii.or.id/content/read/39/342/Hasil-Survei-Penetrasi-dan-Perilaku-Pengguna-Internet-Indonesia-2017

Austin, M. P., Frilingos, M., Lumley, J., Hadzi-Pavlovic, D., Roncolato, W., Acland, S., … Parker, G. (2008). Brief antenatal cognitive behaviour therapy group intervention for the prevention of postnatal depression and anxiety: a randomised controlled trial. *Journal of Affective Disorders, 105*(1–3), 35–44. https://doi.org/10.1016/j.jad.2007.04.001

Badan Penelitian dan Pengembangan Kesehatan Departemen Kesehatan Republik Indonesia. (2013). *Riset Kesehatan Dasar 2013.* Jakarta: Badan Penelitian dan Pengembangan Kesehatan Departemen Kesehatan Republik Indonesia.

Barak, A., Hen, L., Boniel-Nissim, M., & Shapira, N. (2008). A comprehensive review and a meta-analysis of the effectiveness of internet-based psychotherapeutic interventions. J*ournal of Technology in Human Services, 26*(2–4), 109–160. https://doi.org/10.1080/15228830802094429

Beaglehole, R., Epping-Jordan, J., Patel, V., Ebrahim, S., Haines, A., Chopra, M., & Kidd, M. (2008). Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care. *The Lancet, 372*(9642), 940–949.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*(561–571).

Bennet-Levy, J., Richards, D. A., Farrand, P., Christensen, H., Griffiths, K. M., Kavanagh, D. J., … Williams, C. (Eds.). (2010). *Oxford Guide to Low Intensity CBT Intervention*. Oxford: Oxford University Press.

Bernal, G., Bonilla, J., & Bellido, C. (1995). Ecological validity and cultural sensitivity for outcome research: issues for the cultural adaptation and development of psychosocial treatments with Hispanics. *Journal of Abnormal Child Psychology, 23*(1), 67–82.

Berry, N., Lobban, F., Emsley, R., & Bucci, S. (2016). Acceptability of interventions delivered online and through mobile phones for people who experience severe mental health problems: a systematic review. *Journal of Medical Internet Research, 18*(5). https://doi.org/10.2196/jmir.5250

Bockting, C. L. H., & van Valen, E. (2015). *Act and feel online: internet-based behavioral activation in Dutch.* Treatment Module.

Bockting, C. L. H., Williams, A. D., Carswell, K., & Grech, A. E. (2016). The potential of low-intensity and online interventions for depression in low- and middle-income countries. *Global Mental Health (Cambridge, England), 3,* e25.

Bockting, C. L. H., Klein, N. S., Elgersma, H. J., van Rijsbergen, G. D., Slofstra, C., Ormel, J., … Burger, H. (2018). Effectiveness of preventive cognitive therapy while tapering antidepressants versus maintenance antidepressant treatment versus their combination in prevention of depressive relapse or recurrence (DRD study): a three-group, multicentre, randomised controlled trial. *The Lancet Psychiatry, 5*(5), 401–410. https://doi.org/10.1016/S2215-0366(18)30100-7

Bolton, P., Bass, J., Neugebauer, R., Verdeli, H., Clougherty, K. F., Wickramaratne, P., … Weissman, M. (2003). Group interpersonal psychotherapy for depression in rural Uganda: a randomized controlled trial. *JAMA, 289*(23), 3117–3124. https://doi.org/10.1001/jama.289.23.3117

Bowerman, B. L., & O'Connell, R. T. (1990). Linear Statistical Models: An Applied Approach (2nd ed.). Boston: PWS-Kent.

Bruckner, T. A., Scheffler, R. M., Shen, G., Yoon, J., Chisholm, D., Morris, J., … Saxena, S. (2011). The mental health workforce gap in low- and middle-income countries: a needs-based approach. *Bulletin of the World Health Organization, 89*(3), 184–194. https://doi.org/10.2471/BLT.10.082784

Buntrock, C., Ebert, D., Lehr, D., Riper, H., Smit, F., Cuijpers, P., & Berking, M. (2015). Effectiveness of a web-based cognitive behavioural intervention for subthreshold depression: pragmatic randomised controlled trial. *Psychotherapy and Psychosomatics, 84*(6), 348–358. https://doi.org/10.1159/000438673

Burton, C., Szentagotai Tatar, A., McKinstry, B., Matheson, C., Matu, S., Moldovan, R., … Help4Mood Consortium. (2016). Pilot randomised controlled trial of Help4Mood, an embodied virtual agent-based system to support treatment of depression.

Journal of Telemedicine and Telecare, 22(6), 348–355. https://doi.org/10.1177/1357633X15609793

Carlbring, P., Hägglund, M., Luthström, A., Dahlin, M., Kadowaki, Å., Vernmark, K., & Andersson, G. (2013). Internet-based behavioral activation and acceptance-based treatment for depression: a randomized controlled trial. *Journal of Affective Disorders, 148*(2–3), 331–337.

Carpenter, L. L., Tyrka, A. R., Lee, J. K., Tracy, A. P., Wilkinson, C. W., & Price, L. H. (2011). A placebo-controlled study of sertraline's effect on cortisol response to the dexamethasone/corticotropin-releasing hormone test in healthy adults. *Psychopharmacology, 218*(2), 371–379.

Chan, A. W., Tetzlaff, J. M., Gøtzsche, P. C., Altman, D. G., Mann, H., Berlin, J. A., … Moher, D. (2013). SPIRIT 2013 explanation and elaboration: guidance for protocols of clinical trials. *BMJ (Clinical Research Ed.), 346,* e7586.

Chiesa, A., Mandelli, L., & Serretti, A. (2012). Mindfulness-based cognitive therapy versus psycho-education for patients with major depression who did not achieve remission following antidepressant treatment: a preliminary analysis. *Journal of Alternative and Complementary Medicine (New York, N.Y.), 18*(8), 756–760. https://doi.org/10.1089/acm.2011.0407

Chowdhary, N., Anand, A., Dimidjian, S., Shinde, S., Weobong, B., Balaji, M., … Patel, V. (2016). The Healthy Activity Program lay counsellor delivered treatment for severe depression in India: systematic development and randomised evaluation. *The British Journal of Psychiatry: The Journal of Mental Science, 208*(4), 381–388.

Chowdhary, N., Jotheeswaran, A. T., Nadkami, A., Hollon, S. D., King, M., Jordans, M. J. D., … Patel, V. (2014). The methods and outcomes of cultural adaptations of psychological treatments for depressive disorders: a systematic review. *Psychological Medicine, 44*(6), 1131–1146. https://doi.org/10.1017/

S0033291713001785

Christensen, H., Griffiths, K. M., & Farrer, L. (2009). Adherence in internet interventions for anxiety and depression: systematic review. *Journal of Medical Internet Research, 11*(2). https://doi.org/10.2196/jmir.1194

Christensen, H., Griffiths, K. M., & Jorm, A. F. (2004). Delivering interventions for depression by using the internet: randomised controlled trial. *BMJ (Clinical Research Ed.), 328*(7434), 265. https://doi.org/10.1136/bmj.37945.566632.EE

Christensen, H., Griffiths, K. M., & Korten, A. (2002). Web-based cognitive behavior therapy: analysis of site usage and changes in depression and anxiety scores. *Journal of Medical Internet Research, 4*(1). https://doi.org/10.2196/jmir.4.1.e3

Christiani, Y., Byles, J., Tavener, M., & Dugdale, P. (2015). Socioeconomic related inequality in depression among young and middle-adult women in Indonesia□s major cities. *Journal of Affective Disorders, 182,* 76–81. https://doi.org/10.1016/j.jad.2015.04.042

Cludius, B., Schröder, J., & Moritz, S. (2018). Expectancy effects in self-help depression treatment: first evidence that the rationale given for an online study impacts the outcome. *Behavioural and Cognitive Psychotherapy, 46*(2), 195–208. https://doi.org/10.1017/S1352465817000571

Cuijpers, P., Karyotaki, E., Reijnders, M., & Ebert, D. D. (2018). Was Eysenck right after all? A reassessment of the effects of psychotherapy for adult depression. *Epidemiology and Psychiatric Sciences,* 1–10. https://doi.org/10.1017/S2045796018000057

Cuijpers, P., & Smit, F. (2002). Excess mortality in depression: a meta-analysis of community studies. J*ournal of Affective Disorders, 72*(3), 227–236.

Cunningham, J. A., Humphreys, K., Kypri, K., & van Mierlo, T. (2006). Formative evaluation and three-month follow-up of an online personalized assessment feedback intervention for problem

drinkers. *Journal of Medical Internet Research, 8*(2), e5. https://doi.org/10.2196/jmir.8.2.e5

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Demyttenaere, K., Bruffaerts, R., Posada-Villa, J., Gasquet, I., Kovess, V., Lepine, J. P., & al, et. (2004). Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization world mental health surveys. *JAMA: Journal of the American Medical Association, 291*(21), 2581–2590. https://doi.org/10.1001/jama.291.21.2581

Dickerson, S., Reinhart, A. M., Feeley, T. H., Bidani, R., Rich, E., Garg, V. K., & Hershey, C. O. (2004). Patient internet use for health information at three urban primary care clinics. *Journal of the American Medical Informatics Association: JAMIA, 11*(6), 499–504. https://doi.org/10.1197/jamia.M1460

Dimidjian, S., Hollon, S. D., Dobson, K. S., Schmaling, K. B., Kohlenberg, R. J., Addis, M. E., … Jacobson, N. S. (2006). Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the acute treatment of adults with major depression. *Journal of Consulting and Clinical Psychology, 74*(4), 658–670. https://doi.org/10.1037/0022-006X.74.4.658

Dobson, K. S., Hollon, S. D., Dimidjian, S., Schmaling, K. B., Kohlenberg, R. J., Gallop, R., … Jacobson, N. S. (2008). Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the prevention of relapse and recurrence in major depression. *Journal of Consulting and Clinical Psychology, 76*(3), 468–477. https://doi.org/10.1037/0022-006X.76.3.468

Donker, T., van Straten, A., Riper, H., Marks, I., Andersson, G., & Cuijpers, P. (2009). Implementation of Internet-based preventive interventions for depression and anxiety: role of support? The design of a randomized controlled trial. *Trials, 10,* 59. https://doi.org/10.1186/1745-6215-10-59

Duplaga, M. (2012). Acceptance of internet-based health care services among households in Poland: secondary analysis of a population-based survey. *Journal of Medical Internet Research, 14*(6), e164. https://doi.org/10.2196/jmir.2358

Eaton, J., McCay, L., Semrau, M., Chatterjee, S., Baingana, F., Araya, R., … Saxena, S. (2011). Scale up of services for mental health in low-income and middle-income countries. *The Lancet, 378*(9802), 1592–1603. https://doi.org/10.1016/S0140-6736(11)60891-X

Ekers, D., Webster, L., van Straten, A., Cuijpers, P., Richards, D., & Gilbody, S. (2014). Behavioural activation for depression; an update of meta-analysis of effectiveness and sub group analysis. *PloS One, 9*(6), e100100.

Ekers, D., Richards, D., McMillan, D., Bland, J. M., & Gilbody, S. (2011). Behavioural activation delivered by the non-specialist: phase II randomised controlled trial. *The British Journal of Psychiatry: The Journal of Mental Science, 198*(1), 66–72. https://doi.org/10.1192/bjp.bp.110.079111

Epskamp, S. (2014). semPlot: Path diagrams and visual analysis of various SEM packages' output. *R package version 0.3.3.*

Ferrari, A. J., Charlson, F. J., Norman, R. E., Patten, S. B., Freedman, G., Murray, C. J. L., … Whiteford, H. A. (2013). Burden of depressive disorders by country, sex, age, and year: findings from the global burden of disease study 2010. *PLoS Med, 10*(11), e1001547. https://doi.org/10.1371/journal.pmed.1001547

First, M. B., Williams, J. B. W., Karg, R. S., & Spitzer, R. L. (2015). *Structured Clinical Interview for DSM-5 - Research Version (SCID-5 for DSM-5, Research Version; SCID-5-RV).* Arlington, VA: American Psychiatric Association.

Fischer, J. E., Bachmann, L. M., & Jaeschke, R. (2003). A readers' guide to the interpretation of diagnostic test properties: clinical example of sepsis. *Intensive Care Medicine, 29*(7), 1043–1051. https://doi.org/10.1007/s00134-003-1761-8

Fleischmann, A., & Saxena, S. (2013). Suicide prevention in the WHO mental health Gap Action Programme (mhGAP). *Crisis: The Journal of Crisis Intervention and Suicide Prevention, 34*(5), 295–296. https://doi.org/10.1027/0227-5910/a000214

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.2307/3151312

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences, 30*(8), 1311–1327. https://doi.org/10.1016/S0191-8869(00)00113-6

Gibbons, R. D. (1993). Some conceptual and statistical issues in analysis of longitudinal psychiatric data. *Archives of General Psychiatry, 50*(9), 739.

Gili, M., Luciano, J. V., Bauzá, N., Aguado, J., Serrano, M. J., Armengol, S., & Roca, M. (2011). Psychometric properties of the IDS-SR30 for the assessment of depressive symptoms in Spanish population. *BMC Medical Research Methodology, 11*(131). https://doi.org/10.1186/1471-2288-11-131

González, D. A., Boals, A., Jenkins, S. R., Schuler, E. R., & Taylor, D. (2013). Psychometrics and latent structure of the IDS and QIDS with young adult students. *Journal of Affective Disorders, 149*(1–3), 217–220. http://dx.doi.org/10.1016/j.jad.2013.01.027

Gun, S. Y., Titov, N., & Andrews, G. (2011). Acceptability of internet treatment of anxiety and depression. *Australasian Psychiatry, 19*(3), 259–264. https://doi.org/10.3109/10398562.2011.562295

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery, and Psychiatry, 23,* 56–62.

Hanlon, C., Luitel, N. P., Kathree, T., Murhar, V., Shrivasta, S., Medhin, G., … Prince, M. (2014). Challenges and opportunities for implementing integrated mental health care: a district level

situation analysis from five low- and middle-income countries. *PLOS ONE, 9*(2), e88437. https://doi.org/10.1371/journal.pone.0088437

Hayes, A. F. (2009). Beyond Baron and Kenny: statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408–420. https://doi.org/10.1080/03637750903310360

Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach.* New York: The Guilford Press.

Herring, M. P., Puetz, T. W., O'Connor, P. J., & Dishman, R. K. (2012). Effect of exercise training on depressive symptoms among patients with a chronic illness: a systematic review and meta-analysis of randomized controlled trials. *Archives of Internal Medicine, 172*(2), 101–111. https://doi.org/10.1001/archinternmed.2011.696

Higgins, J. P. T., & Green, S. (2011). Cochrane Handbook for Systematic Reviews of Intervention Version 5.1.0 [updated March 2011].

Hoeft, T. J., Fortney, J. C., Patel, V., & Unützer, J. (2018). Task-sharing approaches to improve mental health care in rural and other low-resource settings: a systematic review. *The Journal of Rural Health, 34*(1), 48–62. https://doi.org/10.1111/jrh.12229

Hoque, M. R., Bao, Y., & Sorwar, G. (2017). Investigating factors influencing the adoption of e-health in developing countries: a patient's perspective. *Informatics for Health and Social Care, 42*(1), 1–17.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55.

Huang, J. C. (2013). Innovative health care delivery system—a questionnaire survey to evaluate the influence of behavioral factors on individuals' acceptance of telecare. *Computers in Biology and Medicine, 43*(4), 281–286. https://doi.org/10.1016/j.compbiomed.2012.12.011

Hwang, W. C. (2009). The formative method for adapting psychotherapy (FMAP): a community-based developmental approach to culturally adapting therapy. *Professional Psychology: Research and Practice, 40*(4), 369–377.

Johansson, R., Ekbladh, S., Hebert, A., Lindström, M., Möller, S., Petitt, E., … Andersson, G. (2012). Psychodynamic guided self-help for adult depression through the internet: a randomised controlled trial. *PLoS ONE, 7*(5), e38021. https://doi.org/10.1371/journal.pone.0038021

Josephine, K., Josefine, L., Philipp, D., David, E., & Harald, B. (2017). Internet- and mobile-based depression interventions for people with diagnosed depression: a systematic review and meta-analysis. *Journal of Affective Disorders, 223,* 28–40. https://doi.org/10.1016/j.jad.2017.07.021

Kakuma, R., Minas, H., van Ginneken, N., Dal Poz, M. R., Desiraju, K., Morris, J. E., … Scheffler, R. M. (2011). Human resources for mental health care: current situation and strategies for action. *The Lancet, 378*(9803), 1654–1663. https://doi.org/10.1016/S0140-6736(11)61093-3

Kanter, J. W., Puspitasari, A. J., Santos, M. M., & Nagy, G. A. (2012). Behavioural activation: history, evidence and promise. The British Journal of Psychiatry: *The Journal of Mental Science, 200*(5), 361–363. https://doi.org/10.1192/bjp.bp.111.103390

Kanter, J. W., Santiago-Rivera, A. L., Santos, M. M., Nagy, G., López, M., Hurtado, G. D., & West, P. (2015). A randomized hybrid efficacy and effectiveness trial of behavioral activation for Latinos with depression. *Behavior Therapy, 46*(2), 177–192. https://doi.org/10.1016/j.beth.2014.09.011

Kelly, M. M., Tyrka, A. R., Anderson, G. M., Price, L. H., & Carpenter, L. L. (2008). Sex differences in emotional and physiological responses to the Trier Social Stress Test. *Journal of Behavior Therapy and Experimental Psychiatry, 39*(1), 87–98. http://dx.doi.org/10.1016/j.jbtep.2007.02.003

Kementerian Kesehatan Republik Indonesia. (2016). *Profil Kesehatan Indonesian Tahun 2015.* Jakarta: Kementerian Kesehatan Republik Indonesia.

Kirmayer, L. J., Narasiah, L., Munoz, M., Rashid, M., Ryder, A. G., Guzder, J., … Pottie, K. (2011). Common mental health problems in immigrants and refugees: general approach in primary care. *CMAJ*, cmaj.090292. https://doi.org/10.1503/cmaj.090292

Kleinman, A. (2004). Culture and depression. *New England Journal of Medicine, 351*(10), 951–953. https://doi.org/10.1056/NEJMp048078

Knaevelsrud, C., Brand, J., Lange, A., Ruwaard, J., & Wagner, B. (2015). Web-based psychotherapy for posttraumatic stress disorder in war-traumatized Arab patients: randomized controlled trial. *Journal of Medical Internet Research, 17*(3), e71. https://doi.org/10.2196/jmir.3582

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Kumar, R., & Indrayan, A. (2011). Receiver operating characteristic (ROC) curve for medical researchers. *Indian Pediatrics, 48*(4), 277–287.

Lange, A., Rietdijk, D., Hudcovicova, M., van de Ven, J.-P., Schrieken, B., & G, M. (2003). Interapy: a controlled randomized trial of the standardized treatment of posttraumatic stress through the internet. *Journal of Consulting and Clinical Psychology, 71*(5), 901–909. https://doi.org/10.1037/0022-006X.71.5.901

Lazzari, C., Egan, S. J., & Rees, C. S. (2011). Behavioral activation treatment for depression in older adults delivered via videoconferencing: a pilot study. *Cognitive and Behavioral Practice, 18*(4), 555–565. https://doi.org/10.1016/j.cbpra.2010.11.009

Lépine, J. P., & Briley, M. (2011). The increasing burden of depression. *Neuropsychiatric Disease and Treatment, 7*(Suppl 1), 3–7.

https://doi.org/10.2147/NDT.S19617

Lewinsohn, P. M. (1985). A Behavioral Approach to Depression. In J. C. Coyne (Ed.) (pp. 150–180). New York: New York University Press.

Lindert, J., Von, O. E., Wehrwein, A., Brähler, E., & Schäfer, I. (2018). Anxiety, depression and posttraumatic stress disorder in refugees - a systematic review. *Psychotherapie, Psychosomatik, medizinische Psychologie, 68*(1), 22–29. https://doi.org/10.1055/s-0043-103344

Lu, J., Yao, J. E., & Yu, C. (2005). Personal innovativeness, social influences and adoption of wireless internet services via mobile technology. *The Journal of Strategic Information Systems, 14*(3), 245–268. https://doi.org/10.1016/j.jsis.2005.07.003

Lyubomirsky, S., & Lepper, H. (1999). A measure of subjective happiness: preliminary reliability and construct validation. *Social Indicators Research, 46,* 137–155.

Mackinnon, A., Griffiths, K. M., & Christensen, H. (2008). Comparative randomised trial of online cognitive–behavioural therapy and an information website for depression: 12-month outcomes. *The British Journal of Psychiatry, 192*(2), 130–134. https://doi.org/10.1192/bjp.bp.106.032078

Manos, R. C., Kanter, J. W., & Luo, W. (2011). The behavioral activation for depression scale-short form: development and validation. *Behavior Therapy, 42*(4), 726–739. https://doi.org/10.1016/j.beth.2011.04.004

Marks, I. M., & Mathews, A. M. (1979). Brief standard self-rating for phobic patients. *Behaviour Research and Therapy, 17*(3), 263–267. http://dx.doi.org/10.1016/0005-7967(79)90041-X

Martell, C. R., Dimidjian, S., & Herman-Dunn, R. (2010). *Behavioral Activation for Depression: A Clinician's Guide.* New York: Guilford Press.

Mascayano, F., Armijo, J. E., & Yang, L. H. (2015). Addressing stigma relating to mental illness in low- and middle-income countries. *Frontiers in Psychiatry, 6*. https://doi.org/10.3389/fpsyt.2015.00038

Mathers, C. D., & Loncar, D. (2006). Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Medicine, 3*(11), e442. https://doi.org/10.1371/journal.pmed.0030442

Mavissakalian, M. (1986). The fear questionnaire: a validity study. *Behaviour Research and Therapy, 24*(1), 83–85.

Mazzucchelli, T., Kane, R., & Rees, C. (2009). Behavioral activation treatments for depression in adults: a meta-analysis and review. *Clinical Psychology: Science and Practice, 16*(4), 383–411.

Mead, N., Varnam, R., Rogers, A., & Roland, M. (2003). What predicts patients' interest in the internet as a health resource in primary care in England? *Journal of Health Services Research & Policy, 8*(1), 33–39. https://doi.org/10.1177/135581960300800108

Menard, S. (2002). *Applied Logistic Regression Analysis* (2nd ed.). Thousand Oaks CA: Sage Publications.

Mogoaşe, C., Brăilean, A., & David, D. (2013). Can concreteness training alone reduce depressive symptoms? A randomized pilot study using an internet-delivered protocol. *Cognitive Therapy and Research, 37*(4), 704–712. https://doi.org/10.1007/s10608-012-9514-z

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med, 6*(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Möller-Leimkühler, A. M. (2002). Barriers to help-seeking by men: a review of sociocultural and clinical literature with particular reference to depression. *Journal of Affective Disorders, 71*(1), 1–9. https://doi.org/10.1016/S0165-0327(01)00379-2

Napolitano, M. A., Fotheringham, M., Tate, D., Sciamanna, C., Leslie, E.,

Owen, N., … Marcus, B. (2003). Evaluation of an internet-based physical activity intervention: a preliminary investigation. *Annals of Behavioral Medicine, 25*(2), 92–99. https://doi.org/10.1207/S15324796ABM2502_04

Naslund, J. A., Aschbrenner, K. A., Araya, R., Marsch, L. A., Unützer, J., Patel, V., & Bartels, S. J. (2017). Digital technology for treating and preventing mental disorders in low-income and middle-income countries: a narrative review of the literature. *The Lancet Psychiatry, 4*(6), 486–500. https://doi.org/10.1016/S2215-0366(17)30096-2

Nobis, S., Lehr, D., Ebert, D. D., Baumeister, H., Snoek, F., Riper, H., & Berking, M. (2015). Efficacy of a web-based intervention with mobile phone support in treating depressive symptoms in adults with type 1 and type 2 diabetes: a randomized controlled trial. *Diabetes Care,* dc141728. https://doi.org/10.2337/dc14-1728

Noviandari, L. (2014). *Hampir Setengah Penduduk Indonesia Mengakses Internet pada Tahun 2018.* Retrieved from https://id.techinasia.com/jumlah-pengguna-internet-indonesia-2014-2018

Nunnally, J., & Bernstein, I. H. (1994). *Psychometric Theory.* New York: McGraw-Hill.

Oliver, M. I., Pearson, N., Coe, N., & Gunnell, D. (2005). Help-seeking behaviour in men and women with common mental health problems: cross-sectional study. *The British Journal of Psychiatry, 186*(4), 297–301. https://doi.org/10.1192/bjp.186.4.297

Osby, U., Brandt, L., Correia, N., Ekbom, A., & Sparén, P. (2001). Excess mortality in bipolar and unipolar disorder in Sweden. *Archives of General Psychiatry, 58*(9), 844–850.

Papas, R. K., Sidle, J. E., Martino, S., Baliddawa, J. B., Songole, R., Omolo, O. E., … Maisto, S. A. (2010). Systematic cultural adaptation of cognitive-behavioral therapy to reduce alcohol use among HIV-infected outpatients in western Kenya. *AIDS and Behavior, 14*(3), 669–678. https://doi.org/10.1007/s10461-009-9647-6

Patel, V., Xiao, S., Chen, H., Hanna, F., Jotheeswaran, A. T., Luo, D., … Saxena, S. (2016). The magnitude of and health system responses to the mental health treatment gap in adults in India and China. *The Lancet, 388*(10063), 3074–3084.

Patel, V., Weiss, H. A., Chowdhary, N., Naik, S., Pednekar, S., Chatterjee, S., … Kirkwood, B. R. (2010). Effectiveness of an intervention led by lay health counsellors for depressive and anxiety disorders in primary care in Goa, India (MANAS): a cluster randomised controlled trial. *The Lancet, 376*(9758), 2086–2095. https://doi.org/10.1016/S0140-6736(10)61508-5

Patel, V., Weiss, H. A., Chowdhary, N., Naik, S., Pednekar, S., Chatterjee, S., … Kirkwood, B. R. (2011). Lay health worker led intervention for depressive and anxiety disorders in India: impact on clinical and disability outcomes over 12 months. *The British Journal of Psychiatry: The Journal of Mental Science, 199*(6), 459–466. https://doi.org/10.1192/bjp.bp.111.092155

Patel, V., Weobong, B., Weiss, H. A., Anand, A., Bhat, B., Katti, B., … Fairburn, C. G. (2017). The Healthy Activity Program (HAP), a lay counsellor-delivered brief psychological treatment for severe depression, in primary care in India: a randomised controlled trial. *The Lancet., 389*(10065), 176–185.

Peltzer, K., & Pengpid, S. (2018). High prevalence of depressive symptoms in a national sample of adults in Indonesia: Childhood adversity, sociodemographic factors and health risk behaviour. *Asian Journal of Psychiatry, 33,* 52–59. https://doi.org/10.1016/j.ajp.2018.03.017

Peters, D. H., Tran, N. T., & Adam, T. (2013). *Implementation Research in Health: A Practical Guide.* Geneva, Switzerland: Alliance for Health Policy and Systems Research. World Health Organization.

Pew Research Center. (2014). *Emerging Nations Embrace Internet, Mobile Technology.* Retrieved from http://www.pewglobal.org/2014/02/13/emerging-nations-embrace-internet-mobile-technology/

Phinney, J. S. (1992). The Multigroup Ethnic Identity Measure: a new scale for use with diverse groups. *Journal of Adolescent Research, 7*(2), 156–176. https://doi.org/10.1177/074355489272003

Rahman, A., Malik, A., Sikander, S., Roberts, C., & Creed, F. (2008). Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster-randomised controlled trial. *Lancet, 372*(9642), 902–909. https://doi.org/10.1016/S0140-6736(08)61400-2

Rai, A., Chen, L., Pye, J., & Baird, A. (2013). Understanding determinants of consumer mobile health usage intentions, assimilation, and channel preferences. *Journal of Medical Internet Research, 15*(8). https://doi.org/10.2196/jmir.2635

Ramaiya, M. K., Fiorillo, D., Regmi, U., Robins, C. J., & Kohrt, B. A. (2017). A cultural adaptation of dialectical behavior therapy in Nepal. *Cognitive and Behavioral Practice, 24*(4), 428–444. https://doi.org/10.1016/j.cbpra.2016.12.005

Rathod, S., Pinninti, N., Irfan, M., Gorczynski, P., Rathod, P., Gega, L., & Naeem, F. (2017). Mental health service provision in low- and middle-income countries. *Health Services Insights, 10.* https://doi.org/10.1177/1178632917694350

Richards, D., & Richardson, T. (2012). Computer-based psychological treatments for depression: a systematic review and meta-analysis. *Clinical Psychology Review, 32*(4), 329–342. https://doi.org/10.1016/j.cpr.2012.02.004

Rochlen, A. B., Zack, J. S., & Speyer, C. (2004). Online therapy: review of relevant definitions, debates, and current empirical support. *Journal of Clinical Psychology, 60*(3), 269–283. https://doi.org/10.1002/jclp.10263

Rockmann, R., & Gewald, H. (2016). Examining older adults' enhanced use of ehealth. *Procedia Computer Science, 98,* 401–406. https://doi.org/10.1016/j.procs.2016.09.061

Rossel, Y. (2012). Lavaan: an R package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1–36.

Rush, A. J., First, M. B., & Burns, B. (2008). *Handbook of Psychiatric Measures* (2nd ed.). Washington, DC: American Psychiatric Publishing.

Rush, A. J., Giles, D. E., Schlesser, M. A., Fulton, C. L., Weissenburger, J. E., & Burns, C. T. (1986). The Inventory of Depressive Symptomatology (IDS): preliminary findings. *Psychiatry Research, 18,* 65–87.

Rush, A. J., Gullion, C. M., Basco, M. R., Jarrett, R. B., & Trivedi, M. H. (1996). The Inventory of Depressive Symptomatology (IDS): psychometric properties. *Psychological Medicine, 26,* 477–486.

Sijbrandij, M., Acarturk, C., Bird, M., Bryant, R. A., Burchert, S., Carswell, K., … Cuijpers, P. (2017). Strengthening mental health care systems for Syrian refugees in Europe and the Middle East: integrating scalable psychological interventions in eight countries. *European Journal of Psychotraumatology, 8*(sup2). https://doi.org/10.1080/20008198.2017.1388102

Sillence, E., Briggs, P., Harris, P. R., & Fishwick, L. (2007). How do patients evaluate and make use of online health information? *Social Science & Medicine, 64*(9), 1853–1862. https://doi.org/10.1016/j.socscimed.2007.01.012

Singla, D. R., Kohrt, B. A., Murray, L. K., Anand, A., Chorpita, B. F., & Patel, V. (2017). Psychological treatments for the world: lessons from low- and middle-income countries. *Annual Review of Clinical Psychology, 13,* 149–181. https://doi.org/10.1146/annurev-clinpsy-032816-045217

Sobowale, K., Nguyen, M., Weiss, B., Van, T. T. H., & Trung, L. T. (2016). Acceptability of internet interventions for youth mental health in Vietnam. *Global Mental Health, 3.* https://doi.org/10.1017/gmh.2016.18

Spek, V., Cuijpers, P., Nyklícek, I., Riper, H., Keyzer, J., & Pop, V. (2007). Internet-based cognitive behaviour therapy for symptoms of

depression and anxiety: a meta-analysis. *Psychological Medicine, 37*(3), 319–328. https://doi.org/10.1017/S0033291706008944

Spence, J., Titov, N., Solley, K., Dear, B. F., Johnston, L., Wootton, B., … Choi, I. (2011). Characteristics and treatment preferences of people with symptoms of posttraumatic stress disorder: an internet survey. *PLOS ONE, 6*(7), e21864. https://doi.org/10.1371/journal.pone.0021864

Stuart, A. L., Pasco, J. A., Jacka, F. N., Brennan, S. L., Berk, M., & Williams, L. J. (2014). Comparison of self-report and structured clinical interview in the identification of depression. *Comprehensive Psychiatry, 55*(4), 866–869. http://dx.doi.org/10.1016/j.comppsych.2013.12.019

Su, W., Fang, X., Miller, J. K., & Wang, Y. (2011). Internet-based intervention for the treatment of online addiction for college students in china: a pilot study of the healthy online self-helping center. *Cyberpsychology, Behavior, and Social Networking, 14*(9), 497–503. https://doi.org/10.1089/cyber.2010.0167

Suwantara, J. R., Lubis, D. U., & Rusli, E. (2005). Evaluasi Beck Depression Inventory sebagai Sarana untuk Mendeteksi Depresi. *Jurnal Psikologi Sosial, 12,* 69–77.

Titov, N., Andrews, G., Davies, M., McIntyre, K., Robinson, E., & Solley, K. (2010). Internet treatment for depression: a randomized controlled trial comparing clinician vs. technician assistance. *PloS One, 5*(6), e10939.

Tol, W. A., Augustinavicius, J., Carswell, K., Leku, M. R., Adaku, A., Brown, F. L., … van Ommeren, M. (2018). Feasibility of a guided self-help intervention to reduce psychological distress in South Sudanese refugee women in Uganda. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA), 17*(2), 234–235. https://doi.org/10.1002/wps.20537

Tomas-Aragones, L., Voicu, C., & Marron, S. E. (2017). The clinical interview and assessment: general considerations. *Romanian Journal of Clinical and Experimental Dermatology, 4*(1).

Topooco, N., Riper, H., Araya, R., Berking, M., Brunn, M., Chevreul, K., … Andersson, G. (2017). Attitudes towards digital treatment for depression: a European stakeholder survey. *Internet Interventions, 8,* 1–9. https://doi.org/10.1016/j.invent.2017.01.001

Trivedi, M. H., Rush, A. J., Ibrahim, H. M., Carmody, T. J., Biggs, M. M., Suppes, T., … Kashner, T. M. (2004). The Inventory of Depressive Symptomatology, Clinician Rating (IDS-C) and Self-Report (IDS-SR), and the Quick Inventory of Depressive Symptomatology, Clinician Rating (QIDS-C) and Self-Report (QIDS-SR) in public sector patients with mood disorders: a psychometric evaluation. *Psychological Medicine, 34*(1), 73–82. https://doi.org/10.1017/S0033291703001107

Tulbure, B. T., Szentagotai, A., David, O., Ștefan, S., Månsson, K. N. T., David, D., & Andersson, G. (2015). Internet-delivered cognitive-behavioral therapy for social anxiety disorder in Romania: a randomized controlled trial. *PloS One, 10*(5), e0123997. https://doi.org/10.1371/journal.pone.0123997

van Rijsbergen, G. D., Bockting, C. L. H., Berking, M., Koeter, M. W. J., & Schene, A. H. (2012). Can a one-item mood scale do the trick? Predicting relapse over 5.5-years in recurrent depression. *PloS One, 7*(10), e46796. https://doi.org/10.1371/journal.pone.0046796

van Rijsbergen, G. D., Kok, G. D., Elgersma, H. J., Hollon, S. D., & Bockting, C. L. H. (2015). Personality and cognitive vulnerability in remitted recurrently depressed patients. *Journal of Affective Disorders,* (173), 97–104. http://dx.doi.org/10.1016/j.jad.2014.10.042

Wallis, A., Roeger, L., Milan, S., Walmsley, C., & Allison, S. (2012). Behavioural activation for the treatment of rural adolescents with depression. *The Australian Journal of Rural Health, 20*(2), 95–96. https://doi.org/10.1111/j.1440-1584.2012.01261.x

Wang, Z., Wang, J., & Maercker, A. (2013). Chinese My Trauma Recovery, a web-based intervention for traumatized persons

in two parallel samples: randomized controlled trial. J*ournal of Medical Internet Research, 15*(9). https://doi.org/10.2196/jmir.2690

Wardenaar, K. J., Veen, T. van, Giltay, E. J., Hollander-Gijsman, M. den, Penninx, B. W. J. H., & Zitman, F. G. (2010). The structure and dimensionality of the Inventory of Depressive Symptomatology Self Report (IDS-SR) in patients with depressive disorders and healthy controls. *Journal of Affective Disorders, 125*(1–3), 146–154. http://dx.doi.org/10.1016/j.jad.2009.12.020

Warmerdam, L., Smit, F., van Straten, A., Riper, H., & Cuijpers, P. (2010). Cost-utility and cost-effectiveness of internet-based treatment for adults with depressive symptoms: randomized trial. *Journal of Medical Internet Research, 12*(5), e53. https://doi.org/10.2196/jmir.1436

Watson, D., Clark, L. A., & Tellegen, A. (1998). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.

We Are Social. (2018a). *2018 Digital Yearbook.* Internet. Retrieved from https://www.slideshare.net/wearesocial/2018-digital-yearbook-86862930

We Are Social. (2018b). *Digital in 2018 Global Overview.* Internet. Retrieved from https://www.slideshare.net/wearesocial/digital-in-2018-global-overview-86860338

Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., … Vos, T. (2013). Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *The Lancet, 382*(9904), 1575–1586. http://dx.doi.org/10.1016/S0140-6736(13)61611-6

WHOQOL Group. (1998). Group development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychological Medicine, 28*(3), 551.

Wilson, E. V., & Lankton, N. K. (2004). Modeling patients' acceptance of provider-delivered e-health. *Journal of the American Medical Informatics Association, 11*(4), 241–248. https://doi.org/10.1197/jamia.M1475

World Bank. (2014a). *Countries and Economies: Low & Middle income.* Retrieved from http://data.worldbank.org/income-level/LMY

World Bank. (2014b). *Internet Users Per 100 People.* Retrieved from http://data.worldbank.org/indicator/IT.NET.USER.P2

World Bank. (2016a). *Individuals Using the Internet (% of Population)* [Data]. Retrieved from https://data.worldbank.org/indicator/IT.NET.USER.ZS

World Bank. (2016b). *Urban Population (% of Total)* [Data]. Retrieved from https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS

World Health Organization. (2008a). *mhGAP: mental health Gap Action Program: Scaling Up Care for Mental, Neurological, and Substance Use Disorders.* Geneva: World Health Organization.

World Health Organization. (2008b). *Task Shifting: Rational Redistribution of Tasks among Health Workforce Teams: Global Recommendations and Guidelines.* Geneva: World Health Organization.

World Health Organization. (2010). *mhGAP Intervention Guide for Mental, Neurological and Substance Use Disorders in Non-Specialized Health Settings.* Geneva: World Health Organization.

World Health Organization. (2011). *Mental health ATLAS 2011.* Geneva: World Health Organization.

World Health Organization. (2013). *Mental Health Action Plan 2013-2020.* Geneva: World Health Organization.

World Health Organization. (2015). *Mental Health ATLAS 2014.* Geneva: World Health Organization.

World Health Organization. (2016). *mhGAP Intervention Guide for Mental, Neurological and Substance Use Disorders in Non-*

Specialized Health Settings – Version 2.0. Geneva: World Health Organization.

World Health Organization. (2017). *Depression and Other Common Mental Disorders: Global Health Estimates.* Geneva: World Health Organization.

World Health Organization. (2018a). *Suicide Data.* Retrieved from http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/

World Health Organization. (2018b). *Suicide Mortality Rate: Data Tables, World Health Statistics 2017* (Country data). Retrieved from http://apps.who.int/gho/data/view.sdg.3-4-data-ctry?lang=en

Wu, D., Yin, H., Xu, S., Carmody, T., & Morris, D. W. (2010). Psychometric properties of the Chinese version of Inventory for Depressive Symptomatology (IDS): preliminary findings. *Asian Journal of Psychiatry, 3*(3), 126–129. http://dx.doi.org/10.1016/j.ajp.2010.08.003

Yang, Y., Kankanhalli, A., & Chandran, S. (2015). A stage model of information technology in healthcare. *Health and Technology, 5*(1), 1–11. https://doi.org/10.1007/s12553-015-0097-z

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. J*ournal of Personality Assessment, 52,* 30–41.

Zweig, M. H., & Campbell, G. (1993). Receiver-operating characteristic (ROC) plots: a fundamental evaluation tool in clinical medicine. *Clinical Chemistry, 39*(4), 561–577.

ENGLISH SUMMARY

English summary

In 2008, the World Health Organization (WHO) developed the "mental health Gap Action Programme" (mHGAP) to scale up mental health care in in countries with low or middle income (the so-called Low and Middle Income Countries or LMICs), and depression is included as one of the prioritized mental illnesses. Depression is a common mental illness and the main cause of the global burden disease. The condition is underdiagnosed and often remains untreated, especially in LMICs. This is mainly due to the limited availability of mental health services and mental health professionals in compared to the patients' ratio, known as the 'mental health gap'. Numbers of important strategies have been recommended, including encouraging evidence-based health care and clinical interventions in LMICs, the use of adapted intervention templates for different countries and local regions, and the use of task sharing by involving lay people in delivering mental health services.

As a first step, we conducted a systematic review to investigate the effectiveness and the efficacy of internet-based interventions for mental health problems in LMICs. We have systematically searched the databases of PubMed, PsycINFO, JMIR and other additional sources. MeSH terms, Thesaurus and free text keywords were used. All randomized controlled trials (RCTs) of internet-based interventions in LMICs were included. We found only three articles reporting the results of RCTs on internet-based interventions for mental health problems in LMICs. The nature of the mental health problems diverse across the three studies, from treatment for internet addiction, Post Traumatic Stress Disorder to depression. None of these studies compared the interventions with an active control condition. In short, there is a lack of studies that examine the effect of internet-based interventions in LMICs, so we cannot draw a firm conclusion on its effectiveness. However, given the reported effectiveness of internet-based interventions in high income countries (HICs) in combination with the sharp increase in internet access in LMICs, internet-based interventions, if found effective in LMICs, could contribute to reduce the 'mental health gap'.

Indonesia is one of the LMICs on the WHO list with a recommendation to reduce the mental health gap through the potential strategies mentioned above. Indonesia is an archipelago country with more than 260 million inhabitants spread over more than 13,000 islands. The point prevalence of depression is reported around 5%. It is a major challenge to get proper screening, diagnosis and treatment for depression off the ground in Indonesia, since the ratio between the number of mental health professionals and the number of inhabitants within the country is highly disproportionate. The use of well-validated self-report questionnaires to measure depression could be part of an answer to this challenge because self report questionnaires are time efficient and potentially cost-effective. We examined the psychometric properties of the Indonesian version of a self-report questionnaire that measures depressive symptoms: the 'Inventory of Depressive Symptomatology Self-Report (IDS-SR)'. The participants were 904 Indonesians (aged 16-61 years, 50.2% female), recruited via an online survey using Qualtrics. Three different confirmatory factor analyses were carried out, namely the model with one factor, three factors and four factors. Convergent and divergent validity were also examined, as well as the reliability of the scales. In addition, an optimal cut-off score for the Indonesian IDS-SR was determined using ROC curve analysis. The three-factor model of 'cognitive/mood', 'anxiety/arousal' and 'sleep disturbance' was best fit with the Indonesian IDS-SR data. Convergent and divergent validity were good. The reliability (Cronbach's alpha) was excellent for the total score, good for the factors 'cognitive/mood' and ' anxiety/arousal', but insufficient for the factor 'sleep disturbance'. The optimal cut-off score of the Indonesian IDS-SR was 14, with a sensitivity of 87% and a specificity of 86%. The optimal cut-off score of the Indonesian IDS-SR is in accordance with the internationally used cut-off score. Given the psychometric properties, it was concluded that the Indonesian IDS-SR can be used to assess depressive symptoms for research and may also contribute to decision making in clinical practice.

Effective and accessible psychological interventions for depression are urgently needed in Indonesia, as in many other LMICs. For Indonesia and other LMICs, the utilization of internet-based interventions can be a promising strategy to reduce the 'mental health gap'. Internet usage

in the country continues to increase, providing the opportunity to reach more people in need across the country. Prior to implementation, we investigated the acceptability of internet-based interventions in Indonesia, by investigating factors that contribute to the intention to use internet-based interventions in Indonesia for a common mental disorder, namely depression. Recruitment fo the study was conducted online from specific social networks on mental health and general social media (n=904, with a mean age of 27.1 and 50.2 % females). The following variables were investigated: (1) behavioral intention to start using internet-based interventions for depression, (2) preference to use them as a replacement for regular treatments and (3) preference to use them as a complement to regular treatments. The predictor variables were socio-demographic characteristics, perceived mental health condition, the level of depression, personal situational characteristics, and a personal attitude of innovativeness toward online services. Our findings show that a large majority reported to be open to use internet-based interventions for depression (73.7%), as well as to use it as a substitution (73.3%) or as a complementary (73%) to regular treatments. Personal innovativeness with regard to online services was the strongest significant predictor for all types of use, even if this was corrected for the current depression level. When added to the analyses separately, the depression level was the second strongest predictive factor for all three dependent variables. Therefore, to increase the adoption of internet-based interventions for depression, it is important to first promote internet use among more people across the country, especially those who are currently depressed.

As a next step, we set up a randomized controlled study in Indonesia for participants with depression, where we investigated the effectiveness of online behavioral activation with support from 'trained lay counselors' (Guided Act and Feel Indonesia [GAF-ID]) compared to online minimal psychoeducation without support (PE). We recruited participants aged ≥ 16 years from the community who scored 10 and above on the Patient Health Questionnaire 9 (PHQ-9) and met criteria for a depressive disorder on the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders 5 (SCID-5). Between 6 September 2016 and 1 May 2017, 313 participants were

randomized to either the GAF-ID group (N = 159, 51%) or the PE group (N = 154, 49%). The randomization was stratified by gender and the severity of the depression (PHQ-9≥15). The primary outcome measure was the score on the depression self-report questionnaire, the PHQ-9 at 10 weeks from baseline. The PHQ-9 scores were also evaluated over 3 months and 6 months follow-ups. Linear mixed modelling was used to relate the intervention with the outcome. All participants were analyzed according to the intention-to-treat principle. Participants in the GAF-ID group showed a lower PHQ-9 score after 10 weeks compared to the PE group (1.26 points lower; 95% CI -2.29 to -0.23, p = 0.017), had a 50% higher chance of remission also after 10 weeks (RR 1.50, 95% CI 1.19 to 1.88, p <0.0001) with a number needed to treat of 4.6. The effect size of 0.24 after 10 weeks was sustained over time (effect size over 3 months was 0.24, and over six months was 0.27). GAF-ID was more effective than psychoeducation, not only to reduce the depressive symptomatology from baseline to 10 weeks and from baseline to 6 months follow-up, but also in inducing remission. This study concludes the hypothesis that guided internet-based interventions are effective in reducing depressive symptomatology, achieving remission and potentially bridging the 'mental health gap' in LMICs.

The current set of studies has shown that upscaling mental health care in LMICs via the internet is both feasible and promising for both research and clinical practice. We recommend replications of these studies including additional control groups, in a broader population in Indonesia and in other LMICs.

NEDERLANDSE SAMENVATTING

Nederlandse samenvatting

(vertaling door Maaike Nauta en Claudi Bockting van de engelse tekst door Retha Arjadi)

In 2008 heeft de Wereldgezondheidsorganisatie (World Health Organisation, WHO) het zogenaamde 'mental health Gap Action Action Program' (mhGAP) ontwikkeld om de geestelijke gezondheidszorg in landen met een laag- of middeninkomen (de zogenaamde 'Low and Middle Income Countries' of LMICs) op te schalen, en depressie is opgenomen als een van de geprioriteerde psychische aandoeningen. Depressie is een veel voorkomende psychische aandoening en de belangrijkste oorzaak van de mondiale ziektelast. De aandoening wordt onvoldoende onderkend en blijft vaak onbehandeld, vooral in LMICs. Dit komt voornamelijk door de beperkte beschikbaarheid van diensten voor geestelijke gezondheidszorg en van professionals in de geestelijke gezondheidszorg in verhouding tot het aantal patiënten. Deze beperkte beschikbaarheid wordt ook wel de "kloof in de geestelijke gezondheid" genoemd (mental health gap). Er worden verschillende strategieën aanbevolen, waaronder het aanmoedigen van evidence-based gezondheidszorg en klinische interventies in LMICs, het aanbevelen van het gebruik maken van blauwdrukken van interventies die voor verschillende landen en lokale regio's kunnen worden aangepast, en het gebruik van leken als gezondheidsmedewerkers in de geestelijke gezondheidszorg (task sharing).

Als eerste stap hebben we een systematische review uitgevoerd om de effectiviteit van online interventies voor psychische aandoeningen in LMICs te onderzoeken. We hebben systematisch de databases PubMed, PsycINFO, JMIR en andere bronnen doorzocht. MeSH-termen, Thesaurus en vrije tekst-trefwoorden werden gebruikt. Alle gerandomiseerde gecontroleerde studies (RCTs) van online interventies in LMICs werden opgenomen. We vonden slechts drie artikelen die de resultaten van een RCT rapporteerden ten aanzien van online interventies voor psychische aandoeningen in LMICs. Ook was de aard van de psychische problemen uiteenlopend in de drie onderzoeken, variërend van een behandeling voor internetverslaving, tot post traumatische stressstoornis en depressie. In geen van deze

studies werden de interventies vergeleken met een actieve controle conditie. Kortom, er is een gebrek aan studies die het effect van online interventies in LMICs onderzoeken, dus we kunnen geen duidelijke conclusie trekken over de effectiviteit ervan. Gezien de bewezen effectiviteit van online interventies in hoge inkomenslanden in combinatie met de sterke toename van de toegankelijkheid van internet in LMICs, zouden online interventies mogelijk, indien effectief bevonden in LMICs, kunnen bijdragen aan van het verkleinen van de 'kloof in de geestelijke gezondheid'.

Indonesië is een van de LMICs op de lijst van de WHO waarbij aanbevolen wordt de kloof in de geestelijke gezondheid te verminderen, onder meer met behulp van deze strategieën. Indonesië is een archipelland met meer dan 260 miljoen inwoners, verspreid over meer dan 13.000 eilanden en heeft zo'n 260 miljoen inwoners. De puntprevalentie van depressie ligt rond 5%. Het is een grote uitdaging om een goede screening, diagnostiek en behandeling voor depressie van de grond te krijgen in Indonesië, aangezien de verhouding tussen het aantal professionals in de geestelijke gezondheidszorg (GGZ) en het aantal inwoners van het land zeer onevenredig is. Het gebruik van goed gevalideerde zelfrapportage vragenlijsten om depressie in kaart te brengen zou deel kunnen uitmaken van een antwoord op deze uitdaging, omdat vragenlijsten tijdbesparend en mogelijk kosteneffectief zijn. We onderzochten de psychometrische eigenschappen van de Indonesische versie van een zelfrapportagelijst die depressieve klachten meet: de 'Inventory of Depressive Symptomatology Self Report (IDS-SR)'. De deelnemers waren 904 Indonesiërs (in de leeftijd van 16-61 jaar, 50,2% vrouwen), geworven via een online onderzoek met behulp van Qualtrics. Er werden drie verschillende confirmatieve factoranalyses uitgevoerd, namelijk van het model met één factor, met drie factoren en met vier factoren. Tevens werden convergente en divergente validiteit onderzocht en de betrouwbaarheid van de schalen. Tot slot werd een optimale cut-off score voor de Indonesische IDS-SR vastgesteld met behulp van ROC-curve-analyse. Het drie-factorenmodel van 'cognitief/ stemming', 'angst/arousal' en 'slaapproblemen' paste het best bij de Indonesische IDS-SR-gegevens. Convergente en divergente validiteit waren goed. De betrouwbaarheid (Cronbach's alfa) was uitstekend

voor de totaalscore, goed voor de factoren 'cognitief/stemming' en 'angst/arousal', maar onvoldoende voor de factor 'slaapproblemen'. De optimale cut-off score van de Indonesische IDS-SR was 14, met een sensitiviteit van 87% en een specificiteit van 86%. De optimale cut-off score van de Indonesische IDS-SR is in overeenstemming met de internationaal gebruikte cut-off score. Gezien de gevonden psychometrische eigenschappen van de schaal, werd geconcludeerd dat de Indonesische IDS-SR kan worden gebruikt voor het beoordelen van depressieve symptomen ten behoeve van onderzoek en mogelijk kan bijdragen aan het nemen van beslissingen in de klinische praktijk.

Effectieve en toegankelijke psychologische interventies voor depressie zijn hard nodig in Indonesië, net als in veel andere LMICs. Voor Indonesië en andere LMICs kan het inzetten van online interventies een veelbelovende strategie zijn om de kloof in de psychische gezondheid te verkleinen. Het internetgebruik in het land blijft toenemen, wat de mogelijkheid biedt om mensen in nood in het hele land te bereiken. Voorafgaand aan de implementatie hebben we de aanvaardbaarheid van online interventies in Indonesië onderzocht, door onderzoek te doen naar factoren die bijdragen aan de intentie om online interventies te gebruiken in Indonesië voor een veelvoorkomende psychische aandoening, te weten depressie. Het onderzoek werd online uitgevoerd en had 904 deelnemers die waren geworven via specifieke sociale media geestelijke gezondheid en via algemene sociale media (gemiddelde leeftijd = 27,1, 50,2% vrouwen). Daarbij werden de volgende variabelen onderzocht: (1) gedragsintentie om online interventies voor depressie te gaan gebruiken, (2) voorkeur om ze te gebruiken als vervanging voor reguliere behandelingen en (3) voorkeur om ze te gebruiken als aanvulling op reguliere behandelingen. De predictor variabelen waren sociaal-demografische kenmerken, zelfgerapporteerde psychische gezondheid, de mate van depressie, persoonlijke situationele kenmerken, en een persoonlijke houding van innovativiteit ten aanzien van online diensten. De resultaten laten zien dat een grote meerderheid aangeeft open te staan voor het gebruik van op internet gebaseerde interventies voor depressie (73,7%), alsook om het te gebruiken als een vervanging van (73,3%) of als een aanvulling op (73%) reguliere behandelingen. Persoonlijke

'innovativeness' ten aanzien van online diensten was de sterkste significante voorspeller voor alle soorten gebruik, zelfs als dit werd gecorrigeerd voor de huidige mate van depressie. Wanneer de mate van depressie afzonderlijk aan de analyses werd toegevoegd, was deze de op één na sterkste voorspellende factor voor alle afhankelijke variabelen. Om de acceptatie van online interventies voor depressie te vergroten, is het belangrijk om eerst het gebruik van het internet te promoten bij meer mensen in het hele land, vooral voor degenen die momenteel depressief zijn.

Als volgende stap hebben we in Indonesië een grote gerandomiseerde studie opgezet gericht op mensen met een depressie, en hebben we de effectiviteit van online gedragsactivatie onderzocht met ondersteuning van 'getrainde leken' (Guided Act en Feel Indonesia [GAF-ID]) in vergelijking met online minimale psycho-educatie zonder ondersteuning (PE). In een gerandomiseerd, gecontroleerd design, werden deelnemers geworven met een leeftijd van ≥16 jaar, die 10 of hoger scoorden op een depressievragenlijst (Patient Health Questionnaire; PHQ-9) en voldeden aan criteria voor een depressieve stoornis op basis van een gestructureerd diagnostisch klinisch interview op basis van de DSM (Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders 5; SCID-5).

Tussen 6 september 2016 en 1 mei 2017 werden 313 deelnemers gerandomiseerd naar de GAF-ID-groep (N = 159, 51%) of PE-groep (N = 154, 49%). Deelnemers werden random toegewezen aan GAF-ID of PE, gestratificeerd naar geslacht en de ernst van de depressie (PHQ-9≥15). De primaire uitkomstmaat was de score op de depressie zelfrapportagevragenlijst, de PHQ-9 op tien weken vanaf de baseline. Als secundaire uitkomsten werden PHQ-9 scores ook bekeken na een follow-up van drie en zes maanden. Linear mix modeling werd gebruikt om de behandelconditie te relateren aan de uitkomst. Alle deelnemers werden geanalyseerd volgens het intention-to-treat principe.

Deelnemers in de GAF-ID-groep hadden na tien weken een lagere PHQ-9-score in vergelijking met de PE-groep, namelijk 1,26 punten lager (95% CI -2,29 tot -0,23, p = 0,017), hebben een 50% hogere kans op remissie na 10 weken (RR 1,50, 95% CI 1,19 tot 1,88, p <0,0001) met

een ‘number needed to treat’ van 4.6. De effectgrootte van 0,24 na tien weken bleef behouden in de loop van de tijd (effectgrootte over drie maanden 0,24, over zes maanden 0,27). GAF-ID was effectiever dan psycho-educatie, niet alleen om de symptomen te verminderen tussen de baseline en tien weken en van de baseline tot zes maanden, maar er waren ook meer deelnemers die in remissie waren. Deze studie geeft ondersteuning voor de hypothese dat begeleide online interventies effectief zijn in het verminderen van depressieve symptomen en het komen tot herstel. Er zijn eerste aanwijzingen dat online interventies mogelijk kunnen helpen om de kloof in de geestelijke gezondheidszorg in LMICs te verminderen.

De huidige reeks studies heeft aangetoond dat schaalvergroting op de geestelijke gezondheidszorg in LMICs via internet, zowel voor onderzoek als voor klinische toepassingen haalbaar en veelbelovend is. We raden replicaties aan van deze studies inclusief additionele controle groepen, in een bredere populatie in Indonesië, en in andere LMICs.

ACKNOWLEDGMENTS

Acknowledgements

This is it, a special book marking the end of my PhD journey. A journey that I once thought was only a dream. A journey that was full of tears and also joys. A journey that had changed my life in so many ways. I would like to thank God and Mother Mary for staying with me throughout the journey. I would also like to express my gratitude to all the people who were with me ever since I decided to start my PhD until the day I write this. Please allow me to mention some specific figures and individuals in this acknowledgments. I realize I will not be able to mention everyone who come across my path during my PhD journey to say thank you, but please know that whether or not you are mentioned in these acknowledgements, I truly appreciate your presence in one of the very meaningful moments in my life. Thank you very much.

First and foremost, I feel obliged to thank the Indonesia Endowment Fund for Education, Ministry of Finance of the Republic of Indonesia. Thank you for trusting me with a full PhD scholarship. I hope the outputs of my PhD project offer some significant benefits for our country, representing the promise I made during my scholarship interview. Also, to the Embassy of The Republic of Indonesia in The Hague. Thank you for the official support you provide for me and all Indonesian students in the Netherlands.

Claudi and Maaike, you both are my role models. Claudi, thank you for replying to my emails, which opened the door for me for the first time to live one of my biggest dreams. I have to honestly say that working under your supervision has been a very tough experience. But only because of it, now I realize that my limit was way above where I thought it was. Thank you for believing in me even when I did not even believe in myself. At this point, I really have to thank you for being a supervisor who was not easy to be pleased. Maaike, thank you for being a motherly supervisor. You were always being very helpful during my PhD journey, from discussing all my research-related questions to answering my not-so-important and silly questions. Thank you for guiding me to find the path I would like to walk in, not only during my PhD in Groningen, but also made me think of what I would like

to do when I come back to Indonesia. Claudi and Maaike, you both make a perfect match as my supervisors. If I ever have to retake my PhD (let's hope I will not have to), I will only be willing to do it again with you both as my supervisors (seriously). Thank you for being very understanding, supportive, and all! There are always other supervisors out there, I know, but I am grateful that the universe let me shared my PhD journey with you.

To collaborators and advisors of my PhD, Steve, Pim, Neerja, Cuno, Mba Yati, and Mba Angel. It was truly an honour to work with all of you. Thank you for sharing your experiences and valuable advices with me. This work could not be done better without you all. To all who were directly supporting my research. Dr. Jap and Dr. Tia from Tarumanagara University, and Dr. Edo, thank you for giving me many valuable advices on how to be a good researcher. To my research assistants, Benny and Nana, you were my angels, thank you for being very accountable research assistants. To my fellow clinical psychologists (Bu Denrich, Pak Sandy, Bu Widya, Cecil, Agnes, Nania, Aenea, and Dhea), lay counselors (Astrid, Aldy, Bagus, Eirene, Erfina, Febriyan, Fenny, Fininda, Handy, Laura, Marsha, Anggi, Patriavi, Ratna, Deni, Dian, Sonya, Titik, Vidya, Winnie, Ajeng, Rita, Dewi, Hotma, Meiliana, Chika, Ruth, Irna, and Nian), and clinical interviewers (Arina, Nisa, Mia, Farah, Felicia, Ferdi, Hany, Iqbal, Irma, Krisma, Liza, Ari, Nadiyya, Nadya, and Stella) in my clinical trial, thank you for your willingness to take parts in my PhD project. To Gilang, thank you for making the time and effort to help me create the illustrations for my internet-based intervention program. They became the key of the programs, and I am glad you were the one who made them for my project. To Tesar, I cannot thank you enough for all your help. Remember to always wear your invisible cape.

To all senior faculty members, colleagues, and friends from Department of Clinical Psychology and Experimental Psychopathology, thank you for your support. Being an international student was hard, but you all made it easier for me. I missed our chit chats in the pantry, a simple "How are you doing?" that usually made my day immediately. You all may not know how much those small things kept my spirit going throughout my PhD. I would like to give my special thanks to

Charmaine, Nicola, Bertine, Christien, Lonneke (both of you), and Martin. Office mates and neighbours, you kept me alive during the hard times. Moving now to UMCG, Btissame, thank you for all the discussion we shared for our PhD projects. Moving again now to AMC, thank you Zhongfang for your supports and for our friendship. I wish you good luck with your PhD. I know you will do great.

To all my Indonesian friends (or, I would say family) in Groningen. My special thanks to Inna, Mba Ira, Ela, Era, Cancan, Vita, Ika, Alfian, Deka, Reni, Ayu, Tata, Yovita, Rachel, May, Gerry, Azka, Frans, Ucon, Afif, Mas Amak and Mba Putri, Mas Ronny, Mba Vera, Mba Erna and Mas Buyung, Bu Ima, Mba Tania, Mba Mala and Mas Frans, and Bude Arie and Pakde Herman. Thank you for the times we spent and the wonderful experiences we shared together in Groningen.

Not only receiving supports from Groningen, I also have a solid support system from home. Papa, mama, koko, cici, kokoblo, thank you for being very supportive all the time. I am grateful to call us family. Retha sayang kalian, terima kasih banyak. Also, to my best friends, Nita, Lingga, Grae, Angel, Yimmy, Moko, Mas Japro, Mba Agatha, Uwi, Reggie, Leo, Indra, Audrey, Chengko, Meris, Tika, Vivi, Nia, Fani, Wita, thank you for checking on me every now and again, for helping me with anything whenever I need it. I wish you knew how much I missed you all when I was still in Groningen.

To my new family at home, all faculty members of Faculty of Psychology, Atma Jaya Catholic University of Indonesia, Jakarta, I would like to thank you all for helping me learn and grow in our faculty as a lecturer and a researcher. Thank you for letting me be part of the family. I would also like to express my special thanks to (again) Mba Angel, Mba Rayini, Bu Murni, Mba Evi, Mba Shanti, Mba Debri, Mba Tania, Mas Adi, Nanda, Yenny, Justin, Widhi, Rocky, Syanes, Indro, and Billy for being very attentive and even allowing me to share some of my responsibilities whenever I need to focus all my attention into finishing my PhD.

CURRICULUM VITAE

Curriculum Vitae

Retha Arjadi was born on December 2nd, 1988 in Bandung, Indonesia. Moving from one city to the other, she went to primary schools in Purwakarta (SD Yos Sudarso) and in Cikarang (SD Karya Iman). In Cikarang, she completed junior high school (SMP Karya Iman) and senior high school (SMA Dian Harapan). In 2006, she started her bachelor education in Psychology at Atma Jaya Catholic University of Indonesia, Jakarta. After graduating in 2010, she moved to Depok and took a master degree majoring Clinical Psychology at University of Indonesia. She graduated a master in clinical psychology and became a licensed clinical psychologist in 2012. Subsequently, she worked for a year as an adjunct lecturer, researcher, and clinical practitioner at Atma Jaya Catholic University of Indonesia, Tarumanagara University, and University of Indonesia. In November 2013 she flew to Groningen, The Netherlands, to start a doctoral program, still in Clinical Psychology. Thanks to the Indonesia Endowment Fund for Education, Ministry of Health, Republic of Indonesia for granting her a full PhD scholarship, so that she could conduct her doctoral research project in which implementing internet-based intervention for depression in her home country, Indonesia. She is currently working in the Faculty of Psychology, Atma Jaya Catholic University of Indonesia, Jakarta, as a full-time lecturer and a clinical practitioner.